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1 INTRODUCTION

The Archival Preservation System (APS) is a custom-developed software system used by NARA to manage the administration of the accession, preservation and reference of permanent, electronic records within the National Archives. APS is used to copy files for the preservation, reference, and storing of catalog information about the files and file storage media in an Oracle relational database. Input from users is most of the catalog information; some catalogued media is read. For example, APS reads certain blocking information from magnetic tape headers.

This APS Operations Manual provides consolidated guidance and direction for NARA personnel engaged with the operations and maintenance of APS. More specifically, NWME personnel will be the main audience for this document. This is a living document; subject to revision and update as the APS System is improved and upgraded. On an annual basis, future versions of the APS operations and maintenance will be defined, refined, and baselined.

1.1 SYSTEM OVERVIEW

APS copies files from one volume to another. For this manual, volumes are defined as individual items of electronic storage media. The volumes tracked in APS are often magnetic tapes but can include diskettes and CDs. The Catalog Database (CDB) is the database that APS uses to store and catalogs the file and volume information. Section 3.4 further details the CDB and its tables.

APS is the client program in a client/server-based system. APS communicates with an APS server over a high-speed local area network (LAN) to store information in the CDB. Multiple APS client workstations can access to the APS server and the CDB based on the APS network arrangement. Figure 1 illustrates an APS production network.

Starting with APS Version 6.0 the APS clients will use Windows XP Professional. The APS server runs under a Microsoft 2003 Enterprise Server operating system and utilizes an Oracle 9i Relational Database Management System (RDBMS). APS workstations can support cartridge tape, open-reel tape, diskette, and CD-RW drives.

The APS server runs under a Microsoft 2003 Enterprise Server operating system and utilizes an Oracle 9i Relational Database Management System (RDBMS). Most APS clients run under Microsoft Windows XP Professional and can support a wide variety of cartridge tape, open-reel tape, diskette, and CD-RW drives. A few APS clients interface to PERTEC interface tape drives. The APS clients that interface to PERTEC interface tape drives run under Windows 98.

Currently, APS has four production networks in operation at NARA. These networks perform processing of data at four different levels of security. The largest network is an unclassified production network; the smaller, self-contained networks operate to support processing at the Title 13, Secret and the Top-Secret SCI security levels.

Test and development personnel sometimes operate APS in a test workstation configuration. The test workstations exist as standalone machines and are loaded with Personal Oracle, the test and development version of Oracle.

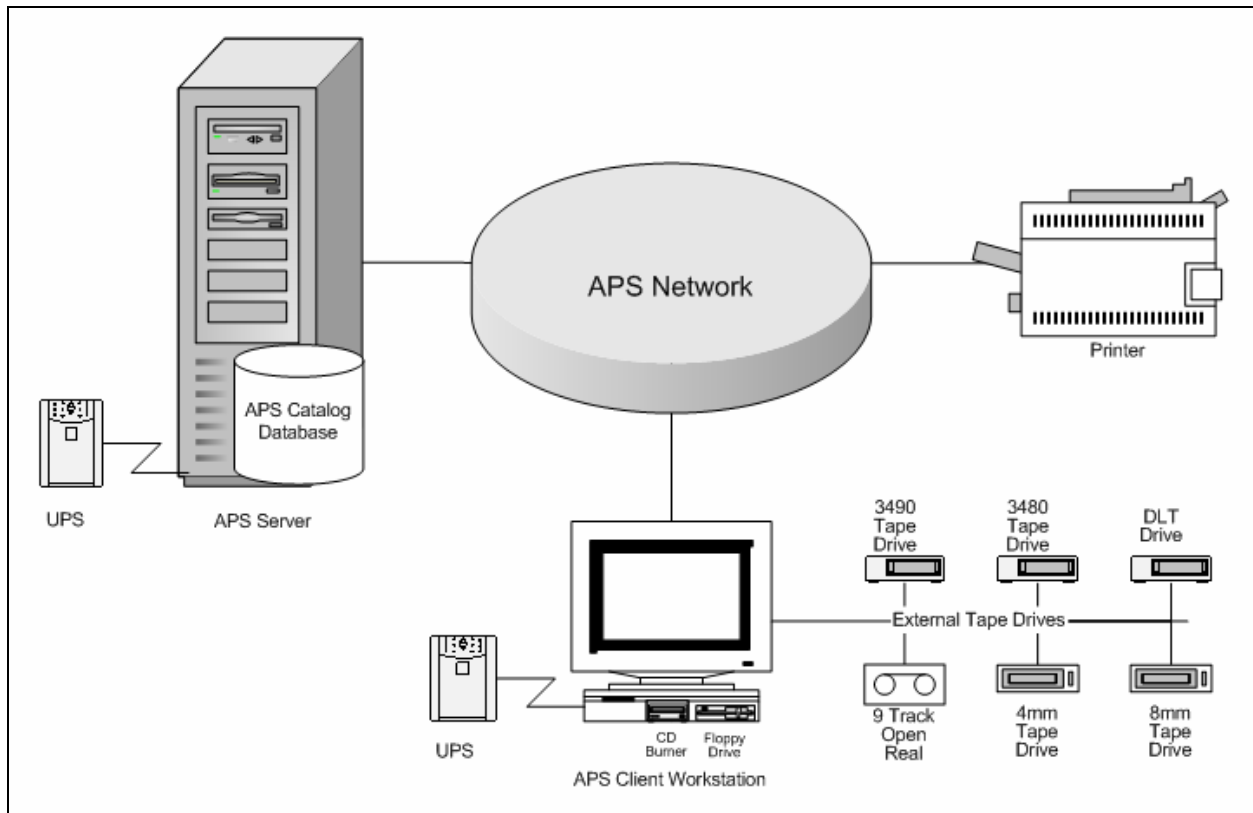


Figure 1: APS Production Network

1.2 REFERENCES

- APS Functional Enhancement Requirements, NARA SML-APS001-DC-REQ.101.R1.V03.01, December 24, 2002.
- Performance Work Statement for Archival Preservation System (APS), Task Order Number NAMA-02-F-0043 Enclosure 2, NARA, July 2002.
- Oracle9i SQL Reference Release 2 (9.2), Part No. A96540-01, Oracle Corporation, March 2002
- APS Users Manual (USM), NARA SML-APS004-DC-USM.104.R1.V02.02, December 17, 2003.

-
- Oracle9i Database Utilities, Release 2 (9.2),
Part No. A96652-01, Oracle Corporation, March 2002

1.3 AUTHORIZED USE NOTICE

Authorized NARA personnel and NARA contractors will use APS for the purpose of preserving and maintaining files and storage volumes for which NARA is responsible. APS access is prohibited for unauthorized individuals.

1.4 POINTS OF CONTACT

The following sections list the APS points of contact for NARA and Anteon Corporation, the contractor responsible for APS Version 6.1 maintenance, upgrade, and support.

1.4.1 NARA Points of Contact

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1.4.2 Contractor Points of Contact

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- Jesse Freeman, Anteon, Software Architect
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1.5 ACRONYMS AND ABBREVIATIONS

Table 1 lists the acronyms and abbreviations used throughout this document.

ACL	Automated Cartridge Loader
APS	Archival Preservation System
ASCII	American National Standard Code for Information Interchange
BDC	Backup Domain Controller
CDB	Catalog Database
DBA	Database Administrator
EBCDIC	Extended Binary Coded Decimal Interchange Code
FACL	Flush-Mount Automated Cartridge Loader
IPM	Interface Personality Module
LAN	Local Area Network
Mbps	Megabits per second
NARA	National Archives and Records Administration
NWME	Electronic and Special Media Records Services Division
ODBC	Open Database Connectivity
PDC	Primary Domain Controller
PVCS	Professional Version Control System
RDBMS	Relational Database Management System
RPC	Remote Procedure Call
SCI	Sensitive Compartmented Information
SDF	Seismic Data Feature
SOM	System Operations Manual
SQL	Structured Query Language
USM	User's Manual

Table 1: Acronyms and Abbreviations

2 HARDWARE OPERATIONS

The following sections discuss the procedures that support the on-going operation of the APS application. Also, the aid of maintaining and upgrading the APS application hardware and software using the current hardware and software environments is discussed.

2.1 OPERATING PROCEDURES

The APS Network normal business hours are from Monday to Friday from 6:30 AM to 7:00 PM, except Federal holidays. APS Network computers are operational 24 hours a day, 7 days a week. Maintenance and system backup may interrupt service and access; this is mostly performed after the normal business hours.

Access to the APS Network is restricted to authorized NWME staff and authorized NWME contractors. Authorization for access to the APS Network must follow the configuration management (CM) practices. The practice involves entering the request into PVCS Tracker, the approval of the request, and then implementation of the request. Usually, access is restricted to users external to the NWME staff. Those external users permitted access must follow the CM process. NWME/APS personnel will approve and log their request into PVCS Tracker. Upon approval, a user ID will be created.

2.2 COMPUTER SYSTEM STARTUP AND SHUTDOWN

The Startup and Shutdown are complex automatic processes that occur by the System Administrator. The user only will see the animated icons and the standard prompts. It is useful to understand the underlying processes to identify and correct problems. The following sections describe what occurs when starting up, operating, and shutting down a computer.

2.2.1 Processes and Procedures

This section provides the recommendations for proper system handling to ensure ultimate system performance.

- **DO** observe proper shutdown procedures. To shut down your system, go to the Start Menu and select Shutdown.
- **NEVER** turn off your computer until you see the message "It is now safe to shut off your computer". Abruptly turning off the system may crash the hard drive and abruptly

turning off the server will crash the APS. If you do not receive the message upon proper shutdown, call for assistance.

- **DO** use the Task Manager function - To force-quit a frozen application, press (only once) the ctrl-alt-delete, and then select the Task Manager.

Caution: If you do this when running the APS Application, you will stop the process at the workstation level but not at the APS Database Server level. If you restart the APS Application and restart the process, this action may slow down the system and/or create multiple entries of the same transaction in the APS Database Server.

- **DO** run Disk Defragmenter at least once a week. Windows 2003 Enterprise Server based systems causes fragmenting on the hard drive and this program will help your machine run more efficiently.
- **DO NOT** store things in the Recycle Bin, empty it daily.
- **DO** check your Temp folder and periodically clean it out.
- **DO NOT** have many programs open simultaneously. Exit any program you are not actively using.
- **DO NOT** connect peripherals (keyboard, mouse) while the system is on. Shut down the system to connect the peripherals and then restart.

2.2.2 System Startup

This section provides information how to boot the APS workstation on a routine basis, and how to log in. It also provides information about resuming from standby

2.2.2.1 Booting and Logging On

When booting up, the computer is turned on, performs BIOS initialization, loads the operating system, and initializes devices to accept logons. When logging on, the user must enter their user ID and password at the logon screen to bring up the user's desktop.

Windows supports hardware and some software services using device drivers. Using various applets from the Control Panel, such as Network or SCSI Adapters, Windows will copy and configure these device drivers to your installation when installing the hardware or software. The management of these device drivers is largely automatic. Occasionally, you may need to modify the device drivers to troubleshoot a problem.

The timeframe to boot up and log on to a new desktop must occur in less than 30 seconds. Certain situations, such as interactions across the network, may require more time for logging on. Windows XP Professional can reduce the number of situations. In fact, the default procedure for logging on to a Windows XP Professional domain is to use cached credentials.

2.2.2.2 Resume from Standby

Standby is an alternative to shutting down the system. It reduces the power consumption of your computer's devices or of your entire system. If you plan to be away from your computer, you may choose to use standby, which places the entire system in a low-power state. Windows XP Professional significantly increases the speed for going in and out of standby.

The APS workstations have been setup automatically to go into standby, and to prompt for a password to leave standby. Standby will switch your entire computer to a low-power state, and turn off devices such as the monitor and hard disks. Also, it will retain the contents in memory and in volatile RAM. When ready to resume use, your computer will quickly come out of standby and restore your desktop to its previous state. Note: Standby does not save your desktop state to disk; a power failure can cause the loss of any unsaved information.

2.2.3 System Shutdown

To shut down the computer, from the Start Menu, select Shutdown. If a power failure occurs on the APS server and the UPS is running on battery, it will initiate a shutdown procedure. Follow any further instructions for shutting down. Only turn off when the message "It is now safe to shut off your computer" is displayed.

2.3 APS NETWORK CONFIGURATIONS

APS has different network configurations depending on where the application resides. There are four rooms for the five security levels. Top Secret and Top Secret / Sensitive Compartmented Information (SCI) are located in the same room. The following section is a breakdown of the APS Hardware configuration located in each room.

Configurations contain the following items in table format:

- **Computer Name:** The name used to identify a server or workstation
- **Operating System:** The operating system installed on the server or workstation
- **Purpose:** Indicates if the computer functions as a server, a workstation, or serves a dual purpose (both server and workstation)
- **Description:** Used to indicate the database environment on the server or the external interface on the workstation
- **Room #:** The room where the server or workstation resides

2.3.1 Unclassified Room (UNCLASSIFIED)

Table 2 lists the configuration for the unclassified production APS located in Room 5304.

Computer Name	Operating System	Purpose	Description	Room #
APS-FINITY	Windows 2003 Enterprise Server	Server	Oracle 9i Server	5304
APS 01	Windows 98	Workstation	Pertec Interface	5304
APS 02	Windows 98	Workstation	Pertec Interface	5304
APS 03	Windows 98	Workstation	Pertec Interface	5304
APS 04	Windows XP Professional	Workstation	SCSI Interface	5304
APS 05	Windows XP Professional	Workstation	SCSI Interface	5304
APS 06	Windows XP Professional	Workstation	SCSI Interface	5304
APS 07	Windows XP Professional	Workstation	SCSI Interface	5304
APS 08	Windows XP Professional	Workstation	SCSI Interface	5304
APS 09	Windows XP Professional	Workstation	SCSI Interface	5304
APS 10	Windows XP Professional	Workstation	SCSI Interface	5304
APS 11	Windows XP Professional	Workstation	SCSI Interface	5304
APS 12	Windows XP Professional	Workstation	SCSI Interface	5304
APS 13	Windows XP Professional	Workstation	SCSI Interface	5304
APS 15	Windows XP Professional	Workstation	SCSI Interface	5304
APS 16	Windows XP Professional	Workstation	SCSI Interface	5304
APS 17	Windows XP Professional	Workstation	SCSI Interface	5304
APS 18	Windows XP Professional	Workstation	SCSI Interface	5304

Table 2: Unclassified Room - Servers and Workstations

2.3.2 SCI Room (TOP SECRET and TS/SCI)

Table 3 lists the configurations for APS with a security classification of Top Secret or Top Secret SCI located in Room 6301. The APS_5600 server and the 5 workstations process media with a security classification of Top Secret and Top Secret SCI. The APS_003 server processes 9-track tapes. APS_003 operates as both the server and the user workstation when processing 9-track tapes.

Computer Name	Operating System	Purpose	Description	Room #
APS-5600	Windows 2003 Enterprise Server	Server	Oracle 9i Server	6301
SCI 01	Windows XP Professional	Workstation	SCSI Interface	6301
SCI 02	Windows XP Professional	Workstation	SCSI Interface	6301
SCI 03	Windows XP Professional	Workstation	SCSI Interface	6301
SCI 04	Windows XP Professional	Workstation	SCSI Interface	6301
SCI 05	Windows XP Professional	Workstation	SCSI Interface	6301

Table 3: SCI Room - Servers and Workstations

2.3.3 Secret Room (SECRET)

Table 4 lists the configuration for APS that processes electronic media with a security classification of 'Secret'.

Computer Name	Operating System	Purpose	Description	Room #
APS_004	Windows 98	Server / Workstation	Personal Oracle 8 Pertec Interface	5307

Table 4: Secret Room - Servers and Workstations

2.3.4 Title 13 Room (CONFIDENTIAL)

Table 5 lists the configuration for APS that processes electronic media with a security classification of 'Title 13'.

Computer name	Operating System	Purpose	Description	Room Location
APS_T13	Windows 2003 Enterprise Server	Server	Oracle 9i	5305
T13_1	Windows 98	Workstation	Pertec Interface	5305
T13_2	Windows XP Professional	Workstation	SCSI Interface	5305
T13_3	Windows XP Professional	Workstation	SCSI Interface	5305
T13_4	Windows XP Professional	Workstation	SCSI Interface	5305

Table 5: Title 13 Room—Servers and Workstations

2.4 APS SERVERS CONFIGURATION

APS Servers are built on an Intel architecture consistent with Windows 2003 Enterprise Server or Windows 98 SE operating systems. All APS servers have Ethernet controller cards operating at 10 or 100 Mbps (megabits per second), using RJ45 or coaxial Ethernet connectors. For backup, they use Diskette drives, CD-RW drives, and DLT external tape drives.

2.4.1 APS Server (Oracle 9i)

The APS servers are located in the Unclassified, Title 13, and the SCI Rooms. These are built on Intel architecture consistent with Windows 2003 Enterprise Server operating systems with an Oracle 9i Database. They have Ethernet controller cards operating at 100 Mbps, using RJ45 or coaxial Ethernet connectors. For backup, they use Diskette drives, CD-RW drives, and DLT external tape drives.

2.4.2 APS Standalone

The APS Standalone is located in the SCI Room. It is built on Intel architecture with Windows 98 SE operating systems with a Personal Oracle 8 Database. The Ethernet controller cards operate at 10 Mbps, using RJ45 or coaxial Ethernet connectors. The 9 Track Pertec Tape Drives use the Pertec interface card and the SCSI Tape drivers use the SCSI Interface card. For information processing and backup purposes, they use Diskette drives, CD-RW drives, and SCSI external tape drives.

2.5 APS WORKSTATIONS CONFIGURATION

The APS Workstations are built on Intel architecture consistent with Windows XP Professional or Windows 98 operating systems. All APS workstations have Ethernet controller cards operating at 10 or 100 Mbps, using RJ45 or coaxial Ethernet connectors. For APS processing purposes, they use Diskette drives, CD-RW drives, and external tape drives. APS workstations can use the following Interface hardware:

- Overland TXi-16 controller card.
- Adaptec or Future Domain ASPI compliant SCSI controller card; used to control SCSI-based tape drives.
- 3480 cartridge tape drive controllers control 3480 cartridge tape drives. These have a SCSI-2 physical interface.

2.5.1 APS Pertec Interface Workstation

The APS Pertec Interface Workstations are located in the Unclassified, the Title 13, Secret, and SCI Rooms. These are built on Intel architecture with Windows 98 operating systems. They have Ethernet controller cards operating at 10 Mbps, using RJ45 or coaxial Ethernet connectors. The 9 Track Pertec Tape drives uses the Pertec Interface card. For Information processing, they use Diskette drives, CD-RW drives, and external tape drives.

2.5.2 APS SCSI Interface Workstation

The APS SCSI Interface Workstations are located in the Unclassified and the SCI Rooms. These are built on Intel architecture with Windows XP Professional operating systems. They have Ethernet controller cards operating at 10 Mbps, using RJ45 or coaxial Ethernet connectors. The external Tape Drives use the SCSI Interface card. For information processing, they use Diskette drives, CD-RW drives and external tape drives.

2.5.3 APS Standalone Workstation

The APS Standalone workstation is located in the Secret Room. This systems perform both server and workstation functions. See Section 2.4.2 for more information on APS Standalones.

2.6 MEDIA STORAGE HARDWARE USED BY THE APS WORKSTATION

APS client workstations can connect the following media devices:

- **9 Track Tape Drive**—The first standard for data backup on computer systems. The tape drives record data in nine parallel tracks using a head assembly with nine separate write

heads, nine read heads, and one erase bar. Later units have two sets of read heads in the assembly, to be able to read in forward and reverse motion. The 9 Track Tape drives use 1/2" open reel tape in varying lengths.

- **3490 Cartridge Tape Drive**—This drive is available in a variety of configurations to accommodate a range of customer options.
- **Automated Cartridge Loader (ACL)**—The drive provides the sequential or random processing of up to ten cartridges to support the unattended backup of a maximum of 24GB of data.
- **Flush-Mount Automated Cartridge Loader (FACL)**—This loader supports sequential or random processing of seven cartridges (16.8GB maximum), with the advantage of an automatic cleaning function.
- **Interface Personality Module (IPM)**—This module enables the M2488 to support a variety of SCSI interfaces that can be easily configured to address current and future requirements.
- **Seismic Data Feature (SDF)**—This feature facilitates a Read-After-Write Verification process of data written to tape. It is ideal for seismic and other applications where it is critical to ensure recorded data is not corrupted.
- **DLT Tape Drive**—This drive achieves sustained native transfer rates of up 21.6 GB per hour and up to 43.2 GB per hour with data compression. Its four-channel Read/Write heads provide state of the art performance.
- **8 mm Tape Drive**—The tape capacity of these drives is up to 60GB per cartridge (150GB with 2.5:1compression). Its improved data transfer rate up to 12.0MB/sec uncompressed and up to 30.0GB/sec compressed, depending on the model. The 8mm Tape Drive features include the capability to read earlier 8 mm tape formats (model dependent), a differential fast/wide SCSI-2 attachment (68-pin) that will connect to differential fast/wide or fast/narrow adapters (LVD/SE on the 7208-345), and a low-cost, high-capacity backup solution. There are three models: 341 for the RS/6000, 342 for the AS/400, and the 345 for the RS6000.
- **4 mm Tape Drive**—This drive has a data storage capacity of 4GB to 20GB (8GB to 40GB with 2:1 data compression), and data transfer rate from 400KB to 3.0MB/sec (800KB to 6.0MB/sec with compression). It uses a Read/Write in DDS-2, DDS-3 and DDS-4 tape cartridges to provide ease of migration and interchange Non-data grade media rejection, which will not permit writing on audio-grade media. Read-After-Write data verification ensures data is written accurately. The drive has a file access average search speed of 40 seconds on any part of a DDS-4 tape;
- **Disk File Drive**—A collection of PC files. APS supports two disk file drives, which are not physical units but are logically treated in a similar manner to the physical tape drives. Disk file drives may include files located in multiple directories and on multiple drives. Thus, a disk file can treat a diskette, CD-ROM or CD-RW as a tape volume. When a disk file is specified as the input unit, APS displays the Select Files dialog box to prompt the user to the files to copy. A disk file unit can be an output unit, and discrete files with user-specified filenames (file id) are written to the directory. Diskettes are random-access storage devices. Files must be stored sequentially and labeled files to be written to disk file units. In addition, since PC files do not contain physical blocks, the concept of

blocksize is not applicable to disk file units and the blocksize can be set to any value. For fixed length records, the block size for disk files must be set to a multiple of the record length. APS will automatically convert invalid Windows filenames to valid names. When APS performs the conversion it will either display a message on the screen or add an entry to the rename file, depending on the current setting in the Copy Preferences dialog box;

- **Tape Image File**—A single PC file containing an image of a physical tape. APS supports two tape-image file units. Like the disk file drives, these are logical, not physical tape units. Tape-images contain data stored in blocks and can contain several logical files separated by tape-marks. Unlike disk file units, tape images are sequential, can contain labeled files, and are treated like physical tape units.
- **CD Burners**—Around since the late 1980's, this type of optical drive can be written to and read from. When writing data the CD drive, it physically marks on the media surface by a low-powered laser.
- **Floppy Diskette Drives**—Around since the early 1970's, this external storage device has been the first portable storage device that was included with the personal computers.

2.7 SYSTEM BACKUP

The backing up of system information is an important but sometimes overlooked operation. The unexpected may occur; a file is deleted or a power failure interrupts your work in a document. The following sections will define and discuss the system backup process.

The System Administrator will assign a Backup Operator to perform the regular backup routine. The role of the Backup Operator has permission to extract files and directories for which the user would normally not have access. The Backup Operator can open any file for backup purposes, redirect the file to any location, and backup and restore files to the appropriate file and directory.

2.7.1 System Backup Strategies

It is important to carefully plan a system backup schedule and scheme. How often a backup should occur (i.e. create a copy and store it in a secure place); depends on the frequency of your files changes, how much time the backup will require, and how much data you are willing to lose. A backup strategy can include Full and Incremental Backups and CDB Export:

- **Full Backup**—Copies all data on your system. You can omit certain directories or file systems, such as temporary directories.
- **Incremental Backup**—Copies only the files that have changed since the last backup.
- **CDB Export**—Performed automatically as part of the Full and Incremental Backup procedures. Backups can be manually performed to preserve the CDB state.

Since many files infrequently change, a full backup can be performed less often than the other days of the week, incremental backups are performed. It is good practice to store the media

containing these backups in a secure, off-site location. The media used for the incremental backup is recycled on a weekly basis.

2.7.2 Tape Rotation

Tape rotation schemes are designed to protect the data as well as minimize the cost of ownership related to data cartridges. Incorporating a mix of daily and weekly backups will provide historical data from various points in time. The following is an explanation of the Twelve-Cartridge Weekly Backup Principle:

1. Start with 12 tapes and label them in the following format:

1) Monday	2) Tuesday	3) Wednesday	4) Thursday
5) Week One	6) Week Two	7) Week Three	8) Week Four
9) Week Five	10) Spare One	11) Spare Two	12) Spare Three

2. Use each of the first four tapes on the respective days of the week: Monday through Thursday. Each morning, remove the previous day's tape from the server drive unit and placed in a fireproof safe or taken off the premises. In the event your physical plant is destroyed, retention of vital data can mean the difference in remaining in business. Even when computers are lost in a physical disaster, data from a tape can be restored to replacements. If data has must be reconstructed or cannot be recovered, such tasks may take far longer or may be impossible.
3. Use each of the five weekly tapes on the respective Friday of the month: 1st, 2nd, etc. Not all months have five weeks, so you won't use all five every month. On the following working day, each Friday's tape must be stored or taken off premises just like any other tape.
4. At the end of the first quarter of the calendar year, use the #1 (Monday) tape to backup, no matter the day of the week the quarter end falls on. Label the container for the tape as Q1, 20XX and label the tape itself with the date of the backup. Replace it with a brand new tape labeled "#1 Monday." At the end of the second quarter, do the same with the #2 (Tuesday) tape and so on and so forth. These quarterly data collections must be archived off-premises and retained indefinitely. In this manner, the four most heavily used tapes are replaced annually. Replace all "weekly" tapes every two years at the end of the fourth quarter).
5. Use a "Spare" tape any time the scheduled cartridge is not available, and put it into the regular rotation. If you have to use "Spare One" on a Wednesday, for example, don't record on the cartridge again during that week.
6. Replace the spare with the original tape when it again becomes available. If it doesn't, obtain a replacement tape.
7. If the original again becomes available, it must be put back into rotation and the "Spare" returned to spare status. If the original tape can no longer be used, re-label the "Spare" and use it in daily rotation. Label and use a new tape as the spare.

Here's what this procedure archives:

- A weeks worth of data is constantly available on tape, along with a month's worth of backups at weekly intervals. A file that may need restoration or rolling back to an earlier version can select from several data sets.
- Tape cartridges are replaced routinely, rather than waiting until a tape ages to the point that the data it contains may not be readable.

2.7.3 System Backup Procedure

Tape backups are performed daily using a DLT 7000 Tape Drive connected to the APS Server. Windows NT backup is the software used to drive the backups. The Backup Operator will perform the backup Monday through Friday. The backup for the APS Server commences at 23:30. Table 6 lists the necessary APS files to back up.

Drive	Capacity (Gb)	Description
C:\Windows	40/80GB	Operating directories System files (approx. 3000 files) Registry files
D:\	40/80GB	Oracle Database files

Table 6: Files to be Backed Up

- A full backup is performed every 7 days.
- Four incremental backups are performed every other day.
- The naming convention for DLT tape backups is APS_###, where ### denotes a 3 digit number representing the server to be backed up.
- Currently, all DLT tapes are stored in the different APS computer rooms. The previous day's tape must be removed from the drive unit and placed in a fireproof area. The latest (mounted) tape is onsite, located in the stacks on the 5th floor, to provide quick recovery for the latest files. This however is at the expense of possibly losing approximately a week's worth of data since the current mounted tape is not duplicated. There is no requirement to place the tapes in an offsite location.

2.7.4 CDB Export Procedure

This procedure saves the APS CDB with any other information in the APS tablespace. To export a copy of the CDB, the System Administrator will start an MS-DOS command shell and execute the following command, substituting appropriate values for Month, Day and Year:

```
exp SYSTEM/password@aps FULL=y FILE=CDB_yyyy_mm_dd.dmp GRANTS=y ROWS=y
```

Input the system password in response to the password prompt. The database will export to the named file in under 5 minutes. The exported database file size can be reduced to approximately

10% of its original filesize by using PKZIP, MKSZIP, GNU gzip or a similar utility. For documentation of the exp export utility, refer to the Oracle Database Utilities Manual.

2.8 DIAGNOSTIC TOOLS

Currently, there are no requirements for APS diagnostic tools.

2.9 DISASTER RECOVERY PROCEDURES

This section contains procedures in the case of a disaster affecting computer components that are crucial to the operation of the APS Network. Also, outlined are the routine administration procedures vital to maintaining a reliable system, such as configuring disks and maintaining well-defined tape backups.

2.9.1 APS Network Location

Table 7 lists the APS Network servers and workstations and their current location.

Computer Name	Operating System	Purpose	Description	Room Name	Room #
APS-FINITY	Windows 2003 Enterprise Server	Server	Oracle 9i Server	Unclassified Room	5304
APS 01	Windows 98	Workstation	Pertec Interface	Unclassified Room	5304
APS 02	Windows 98	Workstation	Pertec Interface	Unclassified Room	5304
APS 03	Windows 98	Workstation	Pertec Interface	Unclassified Room	5304
APS 04	Windows XP Professional	Workstation	SCSI Interface	Unclassified Room	5304
APS 05	Windows XP Professional	Workstation	SCSI Interface	Unclassified Room	5304
APS 06	Windows XP Professional	Workstation	SCSI Interface	Unclassified Room	5304
APS 07	Windows XP Professional	Workstation	SCSI Interface	Unclassified Room	5304
APS 08	Windows XP Professional	Workstation	SCSI Interface	Unclassified Room	5304
APS 09	Windows XP Professional	Workstation	SCSI Interface	Unclassified Room	5304

Computer Name	Operating System	Purpose	Description	Room Name	Room #
APS 10	Windows XP Professional	Workstation	SCSI Interface	Unclassified Room	5304
APS 11	Windows XP Professional	Workstation	SCSI Interface	Unclassified Room	5304
APS 12	Windows XP Professional	Workstation	SCSI Interface	Unclassified Room	5304
APS 13	Windows XP Professional	Workstation	SCSI Interface	Unclassified Room	5304
APS 15	Windows XP Professional	Workstation	SCSI Interface	Unclassified Room	5304
APS 16	Windows XP Professional	Workstation	SCSI Interface	Unclassified Room	5304
APS 17	Windows XP Professional	Workstation	SCSI Interface	Unclassified Room	5304
APS 18	Windows XP Professional	Workstation	SCSI Interface	Unclassified Room	5304
APS-5600	Windows 2003 Enterprise Server	Server	Oracle 9i Server	SCI Room	6301
APS 01	Windows XP Professional	Workstation	SCSI Interface	SCI Room	6301
APS 02	Windows XP Professional	Workstation	SCSI Interface	SCI Room	6301
APS 03	Windows XP Professional	Workstation	SCSI Interface	SCI Room	6301
APS 04	Windows XP Professional	Workstation	SCSI Interface	SCI Room	6301
APS 05	Windows XP Professional	Workstation	SCSI Interface	SCI Room	6301
APS_004	Windows 98	Server / Workstation	Personal Oracle 8 Pertec Interface	Secret Room	5307
APS_T13	Windows 2003 Enterprise Server	Server	Oracle 9i	Title 13 Room	5305
T13_1	Windows 98	Workstation	Pertec Interface	Title 13 Room	5305

Computer Name	Operating System	Purpose	Description	Room Name	Room #
T13_2	Windows XP Professional	Workstation	SCSI Interface	Title 13 Room	5305
T13_3	Windows XP Professional	Workstation	SCSI Interface	Title 13 Room	5305
T13_4	Windows XP Professional	Workstation	SCSI Interface	Title 13 Room	5305

Table 7: Servers and Workstations

2.9.1.1 Determining Damaged Equipment.

In the event of a disaster, the System Administrator will follow these steps to determine the damage on the APS Network equipment. Currently, there are no requirements for testing of recovered equipment.

1. Assess the damage
2. Determine if any hardware components have been damaged and what can be recovered
3. Check the maintenance contract to see if the hardware is covered by warranty
4. Set priorities to which hardware devices need immediate attention
5. Call the relevant hardware vendors to arrange for replacement parts/hardware. Provide them with the component's serial number
6. For damaged components such as the motherboard or power supply, place a service call with the appropriate Hardware House providing details of the problem. Arrangements must be made to replace the damaged part(s)
7. Contact relevant technical staff to organize installation of communication, Ethernet cables, power outlets, and other devices
8. Replace damaged disks with new disks
9. Connect new/repaired hardware devices to the network (SCSI adapters and tape drives)
10. Restore operating systems and data on the host machines
11. Ensure that the functionality of the machines has been restored
12. Reinstall the operating systems on the workstation machines
13. Check that all services and applications are successfully installed
14. Once the hardware has been restored, reboot and check the configuration settings on your computer.

2.9.1.2 Restoring the Operating System and Checking its Integrity.

This section describes how the System Administrator will restore the operating system and return the computer to a working state.

1. From the Start menu, select Shutdown.
2. A Shutdown Windows dialog box appears. From the drop-down list, select Restart and click the OK button.

-
3. The following message will appear; “Please select the operating system to start”, then press the F8 key. You may have to press F8 several times to activate the Safe Mode.
 4. Use the arrow keys to highlight the appropriate Safe Mode option and then press the Enter key.
 5. If you have a dual-boot or multiple-boot system, use the arrow keys to choose the installation that you need to access and then press the Enter key.

Notes:

- Safe Mode will limit your access to only basic files and drivers. The Safe Mode with Networking option will load the files, drivers, and the essential services and to start networking. The Safe Mode with Command Prompt option is identical to Safe Mode except that a command prompt is started instead of the graphical user interface. Another option is the Last Known Good Configuration that will start your computer using the registry information that was saved at the last shutdown.
 - Safe mode helps diagnose system problems. If a symptom does not reappear when you start in safe mode, you can eliminate the default settings and minimum device drivers as possible causes. If a newly added device or a changed driver is causing problems, you can use safe mode to remove the device or reverse the change.
 - Safe Mode will not help you if the Windows system files required to start the system are corrupted or damaged. In this case, the Recovery Console may be able to help you.
6. Check the integrity of the root file system.
 7. Restore all file systems from the last full backup and all subsequent incremental backups until the date of the crash
 8. Check the integrity of the restored file systems.

2.9.2 APS Server is Completely Damaged

This section provides direction in the event the APS Server is fully damaged, and urgent attention is needed to reestablish normal APS Network operation.

2.9.2.1 Establishing a New APS Server

Data on the APS server may become inaccessible, due to a major hardware failure. The following steps show how the System Administrator will establish a new APS Server.

1. Make arrangements to obtain a replacement server. Place a service call to Customer Services, providing them with the serial number and other necessary details.
2. If it is not possible to obtain a server within a reasonable timeframe (i.e. 24 to 48 hours), acquire a PC that has the following minimum requirements
 - Pentium IV
 - 512 Mb RAM, at least 36 GB hard disk

Note: The current capacity of the server hard disk is 180 GB. It must be possible to run the system with at least 36 GB.

2.9.2.2 Installing Windows 2003 Enterprise Server and user data

After establishing a new APS server, the System Administrator will install Windows 2003 Enterprise Server and user data. The following steps describe how to install Windows 2003 Enterprise Server v4 and user data

1. Boot off the Windows 2003 Server CD
2. Install the appropriate SCSI device drivers
3. Install the appropriate video drivers
4. Enter all relevant network information (hostname, IP address, etc)
5. Install the following critical applications. These will enable communication and authorization for APS to access the DLT tape drive so that the user data can be restored from backup tape.
6. Ensure that the following corresponding services are running
 - a. Remote Procedure Call (RPC) Locator
 - b. Remote Procedure Call (RPC) Service
7. Select files to recover from tape for a specified backup date. Note that the C: drive contains system files and local applications.
8. Install Oracle 9i Enterprise using the installation procedure in section 2.9.2.3.
9. Restore the CDB using the CDB import procedure in the section. 2.9.2.5.

2.9.2.3 Installing Oracle 9i Enterprise

1. Insert the Oracle9i Database Release 2 (9.2.0.1.0) CD
2. Select "Next" from the Oracle Universal Installer screen
3. Follow the instructions in the screen.
4. The following are the values that you need to complete the installation:

SELECTED_LANGUAGES=	English
INSTALL_TYPE=	Enterprise Edition
DATABASE CONFIG TYPE=	General Purpose
RDBMS INSTALLING=	true
LAUNCH NET CONFIG ASSIST=	true
AUTO START Apache=	true
ORACLE_HOME=	D:\Oracle\Ora92
ORACLE_HOME_NAME=	OraHome92
INSTALL_TYPE=	Typical
OPTIONAL_CONFIG_TOOLS=	Oracle Database Configuration Assistant
DATABASE_SID=	APS
CREATE DB=	true

2.9.2.4 Checkpoints After Data Recovery:

To ensure a successful data recovery process, the System Administrator must review the following checkpoints:

1. Ensure that the following shares have been restored correctly: drives, profiles, pc apps, users.
2. A trust relationship between the APS Server and the APS Workstations domains exists

-
3. The APS database contains all the expected user account and security information. This can be checked by checking the users in the Security Management in the Oracle Enterprise Manager Console.
 4. The printer drivers have been recovered
 5. Perform a test login (from another workstation) with at least one user account and ensure that the relevant network resources are available, i.e. user data, profiles and printers.

2.9.2.5 CDB Import Procedure

The CDB Import procedure restores the APS CDB with other information in the APS tablespace. This is assuming that the APS tablespace and SY1 user have been restored and the export file, if compressed using a “zip” utility, has been restored to full size. To import a copy of the CDB, the System Administrator will start an MS-DOS command shell and execute the following command, substituting appropriate values for Month, Day, and Year:

```
imp sytem/password@aps as sysdba

Import file: expdat.dmp > CDB_yyyy_mm_dd.dmp
Enter insert buffer size (minimum is 8192) 30720>
import done in WE8DEC character set and AL16UTF16 NCHAR character set
List contents of import file only (yes/no): no > no
Ignore create error due to object existence (yes/no): no > yes
Import grants (yes/no): yes > yes
Import table data (yes/no): yes > yes
Import entire export file (yes/no): no > yes
```

Input the system password in response to the password prompt. The importation procedure will take 15 to 30 minutes and will require 1 to 2 GB of disk space. See the Oracle Database Utilities manual, for documentation of the import utility.

2.9.2.6 Promoting a BDC to a PDC

Promoting a BDC to a PDC procedure will prepare for any threat of APS Server failure. To promote a BDC to a PDC, the System Administrator will perform the following procedure:

1. Obtain a backup server that satisfies the following minimum requirements:
 - Pentium II 300
 - 128 Mb RAM, at least 8Gb hard disk
2. Boot off the Windows 2003 Enterprise Server CD
3. Choose from list to Install as a Backup Domain Controller (BDC).
4. Licensing mode-per seat.
5. Enter network information. Use a hostname and IP address not currently used. This will be switched to the correct name and IP address at the end of this section.
6. Use the scopy utility to copy the directories (and subdirectories) in order of importance:
7. Synchronize the BDC with the Primary Domain Controller (PDC), i.e. go to Start/Administrative Tools/ Server Manager/Computer/Synchronize Entire Domain.

-
8. Promote the BDC to a PDC in the same menu as the previous step go to Promote to Primary Domain Controller. Note that this will also automatically demote the current PDC to a BDC.
 9. Shutdown the (faulty) APS Server.
 10. Rename the new PDC to APS and update the IP address in the TCP/IP properties section.
 11. Reboot the new APS Server.

2.9.2.7 Restoring CDB Diagnostics Package Operability

The activities required to install the CDB Diagnostics Package are as follows:

- Install Crystal Reports X
- Install ASP .Net Server Support
- Install the Oracle .Net interface
- Install CDB Diagnostics Software

The steps required to restore the CDB Diagnostics Package are presented in the following subsections, with a basic description of the components being installed. The presentation is oriented toward persons with a Windows system administrator level of expertise.

2.9.2.7.1 Install Crystal Reports X

Crystal Reports is the report-generation package used to generate data displays and PDF document reports for most of the CDB diagnostic outputs. When it is installed, the Windows IIS server is enabled and configured automatically. The Crystal Reports product used to display the Crystal Reports forms on a Web Server is Crystal Enterprise 10 Embedded Server. The steps required to install this product are as follows:

1. Insert the Crystal Enterprise 10 Embedded Server installation disk and activate the ceas.msi installer.
2. Accept the license agreement.
3. Enter product key code, from sleeve of Crystal Enterprise 10 Embedded installation disk.
4. Select Custom Install.
5. Expand Report Application Server icon.
6. Expand Data Access and Output formats.
7. Expand Database Access.
8. Select Logs.
9. Select Entire Feature Will Be Installed.
10. Click Next twice. Installation will begin.
11. Select registered member option and enter the registration number. (8113619045 is the production server registration number).
12. Finish the installation.

2.9.2.7.2 Install ASP .Net Server Support

ASP .NET is the interface support library for Microsoft Applications Server Pages .NET, which is the type of web page generated by Visual Basic .NET. This product is shipped with Windows Server 2003 but it is not activated in the default configuration. The steps required to activate ASP .NET support are as follows:

1. Select Settings/Control Panel/Administrative Tools/Manage Your Server
2. Select Add or Remove Role
3. The Configure Server wizard appears. Click Next.
4. Select (click) Application Server, then click Next.
5. Application Server options screen displayed. Select Enable ASP .NET. Do not enable FrontPage. Click Next.
6. Summary window displays. Click Next.
7. Browse to C:\i386 in response to request for Windows CD-ROM. (if C:\i386 folder missing, use the Windows 2003 server CD-ROM).
8. Wait for the Configuration process to complete. This takes about 2 minutes on a 3 GHz CPU.
9. Click Finished.
10. Start Administrative Tools/Services.
11. Change ASP.NET properties to start automatically, not manually. Start the ASP .NET service.

2.9.2.7.3 Install Oracle .Net interface

The Oracle .Net interface enables code written in Visual Basic .NET to send SQL commands to Oracle databases. The steps required to activate the Oracle .Net interface are as follows:

1. Activate the oracle_net.msi installer, from /ServerConfiguration directory on the APS installation disk.
2. Click Next twice
3. Accept the license agreement, click Next.
4. Enter user name (suggested: “NWME APS”) and Organization (suggested: “National Archives and Records Administration”). Click Next.
5. Click Install. This installation takes about one minute from CD-ROM.
6. Click Finished.
7. Confirm that the Microsoft Oracle Client is in the Start>Programs menu

2.9.2.7.4 Install CDB Diagnostics Software

The CDB diagnostics software is the set of ASP web pages, Crystal Reports forms, and supporting configuration files and binary code libraries developed by Anteon to assemble and present CDB diagnostics information. It includes some supporting libraries for Crystal Reports developed by Business Objects, Incorporated. The steps required to install the CDB Diagnostics Software are as follows:

1. Create a directory to store Crystal Reports forms developed for APS. C:\Reports is the recommended directory for systems with lots of extra space on the C: drive. D:\Reports is the recommended directory for systems with relatively small amounts of extra space on the C: drive.
2. Copy all .rpt files in the directory \CDB Diagnostic Utility\Reports from the APS installation disk to the Crystal Reports forms directory (e.g. "D:\Reports").
3. Create a directory to store the APS web server support file hierarchy. C:\ApsWeb is the recommended directory for systems with lots of extra space on the C: drive. D:\ApsWeb is the recommended directory for systems with relatively small amounts of extra space on the C: drive.
4. Perform a tree copy of all files in \CDB Diagnostic Utility\Startup\APSWEB from the APS installation disk to the APS web server support directory (e.g. "D:\ApsWeb").
5. Start the Microsoft Management Console (MMC) snap-in for IIS. This can be activated using Settings\Control Panel\Administrative Tools\Internet Information Server.
6. Stop operation of the default web site.
7. Add a new virtual directory to the default web site. Name it ApsWeb.
8. Set the content directory to the APS web server support directory (e.g. "D:\ApsWeb").
9. Enable Read, Run scripts and Execute permissions.
10. Start the default web site.
11. Make sure the IUSR_HostName user is a member of the ORA_DBA group.
12. Make sure that the Oracle database is running, and that it can be accessed using the TNS names APS and APSW.
13. Start the Crystal Configuration Manager, from Start\Programs\Crystal Enterprise 10.
14. Select the Crystal Reports Application Server. Stop it.
15. Start the Properties pop-up tool for the Crystal Reports Application Server.
16. Select the Parameters tab.
17. Select Server from the Option Type pull-down.
18. Set Report Directory to the Crystal Reports forms directory (e.g. "D:\Reports").
19. Click ok. Start the Crystal Reports Application Server.
20. Start an IE browser. Direct it to "/HostName/ApsWeb".
21. The CDB Diagnostics Package login screen should appear.
22. Login to CDB diagnostics package. Test all screens for operability.

2.9.3 APS Server is Partially Damaged

This section provides direction in the event the APS Server is damaged or disrupting normal user services, requiring urgent attention.

2.9.3.1 Faulty Motherboard or Dead Power Supply

In the event of a faulty motherboard or dead power supply, the System Administrator will place a service call with the Computer House Customer Service and provide the computer's serial number. Customer Service will give you a job number for future reference. A serviceperson will come out to perform the repairs.

2.9.3.2 System Disk Crash

A complete system recovery may be required when damage occurs to the internal SCSI disk, preventing the system from booting up (rebooting). If the system is unable to detect the disk from the bootup console output (with SCSI ID set to 0), then the System Administrator must place service call to arrange for a replacement disk.

To re-install Windows 2003 Enterprise Server, the System Administrator will perform the following steps:

1. Ensure the SCSI controller card is correctly installed before installing Windows 2003 Enterprise Server.
2. Insert the Windows 2003 Enterprise Server CD and then boot up the system
3. During the initial boot phase (when the blue screen appears), press F6 to interrupt and specify other SCSI devices to be installed.
4. Select the Adaptec SCSI Controller
5. The SCSI driver is located on a floppy disk labeled SCSI controller drivers.
6. Other devices to install may include:
 - PDC (Primary Domain Controller)
 - Network drivers
 - Video drivers
 - Install service packs.

2.9.4 Setting Up a New Workstation

The following sections provide direction in the event the APS workstation is damaged or disrupting normal user service, requiring urgent attention.

2.9.4.1 Setting Up the IBM USER Account

The following procedure is to password protect the default IBM USER account. The System Administrator will perform these steps.

-
1. Select Start -> Settings -> Control Panel -> User Accounts
 2. The User Account screen appears
 - a. Select IBM USER
 - b. Select: Create Password
 - c. Enter the following information
 - Password: ibmuser
 - Confirm password: ibmuser
 - Hint: Same without space
 - d. Press OK

2.9.4.2 Setting Up the New Computer Name

The following procedure is to change the computer name for different workstations in the APS network. The System Administrator will perform these steps.

1. Select Start -> Settings -> Control Panel -> System -> Computer Name
2. In the Computer name field, enter the name of the computer (APS01, APS02)
3. Select change the domain, enter the new computer name
4. Press OK
5. Restart the computer

2.9.4.3 Setting Up the New Domain Name

The following procedure is to change the domain name for different workstations in the APS network. The domain name must be changed to add the APS workstations to the APS network. The System Administrator will perform these steps.

1. Login IBM USER/ibmuser
2. Select Start -> Settings -> Control Panel -> System -> Computer Name
3. Select change the domain and enter the new domain name (NARA - Unclassified Room; CERSCIF - SCI room)
4. Press OK
5. Restart the computer

2.9.4.4 Setting Up the New Network ID

The following procedure is to set up the network ID for different workstations in the APS network. The APS workstations are added to the APS network. The System Administrator will perform these steps.

1. Login IBM USER/ibmuser
2. Select Start -> Settings -> Control Panel -> System -> Computer Name
3. Select the Network ID.
4. The Network Identification Wizard screen appears
 - a. Press Next
 - b. Select this computer is part of a business network and press Next
 - c. Select My company uses a network with a domain, and press Next

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- d. Press next
 - e. Enter the following information on the User Account and Domain Identification screen:
 - User Name: aps_dev
 - Password: aps_dev
 - Domain: NARA
 - f. Press Next
 - g. Enter the following information on the Computer Domain screen:
 - Computer Name: The new Computer Name
 - Computer Domain: NARA
 - h. Enter the following information on the Domain and User Name and Password screen:
 - User Name: aps_dev
 - Password: aps_dev
 - Domain: NARA
 - i. Press OK
 - j. Select "Add the following user" on the User Account screen
 - User Name: aps_dev;
 - User Domain: NARA
 - k. Press Next
 - l. Select Other: Administrator and press Next on the Access Level screen:
 - m. Press finish.
 - n. Press OK to restart for the change to take effect
 - o. Press Yes on the System Settings Change screen
5. Restart the computer

2.9.4.5 Installing the EZ-SCSI Software

The following procedure is a guide for installing the EZ-SCSI software. This software is necessary for the external SCSI devices configuration. The System Administrator will perform these steps.

1. Login as IBM USER
2. Insert the EZ-SCSI CD
3. Click No at the ConfigSafe screen
4. Select EZ-SCSI from the Master Setup Screen
5. Insert the patch diskette in the floppy drive
6. Follow the instructions on the screen for typical configuration
7. Press Yes for the registry editor for aimgtap.reg
8. Press Yes for the registry editor for dm.reg
9. Select Reboot.

2.9.4.6 Installing the EZ-CDCreator Lite Software

The following procedure is a guide for installing the EZ-SCSI software. This software is necessary for the external CD RW functionality. Without this software, CD operations are not available from the APS application. The System Administrator will perform these steps.

1. Remove the patch diskette from the floppy drive

-
2. Select Ez-CDCreator Lite from the Master Setup Screen
 3. Follow the instructions on the screen for typical configuration
 4. Select "Yes, I want to restart my computer now", press Finish
 5. Login as IBM user
 6. Select Start -> Settings -> Control Panel -> Add or Remove Programs
 7. Select Adaptec Easy CDCreator Lite, press Change/Remove
 8. Press Yes at the Confirm File Deletion Screen
 9. Say No at the remove shared file for cdr4vsd.sys
 10. Say No at the remove shared file for cdr4dll.dll
 11. Press Ok when uninstall successfully completed
 12. Press Close the Add Remove Programs Screen

2.9.4.7 Installing the Oracle 9i Client Software

The following procedure is a guide for installing the Oracle 9i Client software. This software is necessary for the communication of the APS software and the CDB Catalog Database. The System Administrator will perform this procedure.

1. Login as IBM USER
2. Insert the Oracle 9i Client CD
3. Click No at the ConfigSafe screen
4. Select Install/Reinstall from the Main Oracle Setup Screen
5. The Oracle Universal installer Welcome Screen appears.
6. Select Next
7. Accept the default file locations and press Next
8. Select Custom Installation type and press Next
9. Deselect Oracle HTTP Server from the Product Component list and Press Next
10. Accept the default component locations and press Next
11. Select Install in the Summary Screen. (the installation will take about 10 minutes)
12. Select Perform Typical Configuration from the Oracle Net Configuration Assistant Screen and press Next
13. Select No. I will create net service names myself and press Next
14. Select Oracle8i or later database or service and press Next
15. Enter APS in the Service Name text box and press Next
16. Select TCP and press Next
17. Enter APS-FINITY in the Host Name text box and select Use Standard Port Number of 1521 and press Next
18. Select Yes, Perform a Test and press Next
19. Ensure the connection test is successful and press Next
20. Enter APS in the Net Service Name text box and press Next
21. Select No and press Next
22. Press Next
23. Press Finish at the Oracle net Configuration Complete Screen
24. Press Exit at the End of Installation Screen.

2.9.4.8 Setting Up the Oracle 9i ODBC Connection

The following procedure is a guide for setting up the Oracle 9i ODBC connection. Without this connection, user validation will be unavailable and users will be unable to access the APS application. The System Administrator will perform this procedure.

1. Select Start -> Programs -> Oracle -> OraHome90 -> Configuration and migration tools -> Microsoft ODBC Administrator
2. Select System DSN tab
3. Select Add
4. Select Oracle in OraHome90 and press Finish
5. In the oracle ODBC driver configuration enter the following information
 - Data Source Name: APS
 - Description: APS Oracle ODBC Connection
 - TNS Service Name: APS
6. Press Test Connection
7. Enter a valid User Name and password at the Oracle ODBC Driver Connect screen
8. Press OK
9. Press OK when the connection is successful
10. Press OK at the Oracle ODBC driver Configuration screen
11. Press OK at the ODBC Data Source Administrator screen
12. Remove the Oracle Installation CD

2.9.4.9 Installing the New APS Software

The following procedure is a guide for installing the new APS Client software. As new releases are deployed, it is necessary to understand how the software is installed. Anteon or the System Administrator will perform this procedure.

1. Insert the APS Software installation CD
2. Open the Windows Explorer screen
3. Create the following subfolders:
 - C:\Program Files\APS\Application
 - C:\Program Files\APS\PrintServer
 - C:\Program Files\APS\APSTAR
4. Select My Computer -> CD Drive -> APS 6.0.x Client
5. Copy the contents of this folder
6. Paste the files in C:\Program Files\APS\Application
7. Insert the APS diskette containing the ini files
8. Copy the corresponding ini file to C:\Program Files\APS\Application
9. Edit the apsw.ini and edit it to point to the correct ini name.
10. Select My Computer -> CD Drive\APS 5.17.8.8 PrintServer\ APS\ APS.5.17.8.8.Work\ PrintServer
11. Copy the contents of this folder
12. Paste the files in C:\Program Files\APS\PrintServer
13. Select my computer -> CD Drive -> APSTAR 2.0.3
14. Copy the contents of this folder
15. Paste the files in C:\Program Files\APS\APSTAR

16. Select my computer -> CD Drive -> APS 6.0.x Client

17. Copy the following files:

- mfc70d.dll
- msvc70.dll
- msvc70d.dll
- msucr70d.dll

18. Paste the files in the following directory:

- C:\WINDOWS\system32

19. Create the following directories

- C:\APSTEMP
- C:\prfiles

2.9.4.10 Customizing the Start Menu

The following procedure is a guide for how to customize the Start Menu to include the different components of the APS application. When creating a new APS workstation, consistency is important to the look of the different APS clients. The System Administrator will perform this procedure.

1. Select Start -> Settings -> Task bar and Start menu ->. Start Menu tab
2. Select Customize
3. Select Add
4. Enter "C:\Program Files\APS\Application\aps.exe" in the text box and press next
5. Press "New Folder" and name it APS and press Next
6. Type APS for the shortcut name
7. Press Finish
8. Select Add
9. Enter "C:\Program Files\APS\PrintServer\PRNTRSRVR.EXE" in the text box
10. Press Next
11. Select the APS folder and press Next
12. Type PRNTRSRVR for the shortcut name
13. Press Finish
14. Select Add
15. Enter "C:\Program Files\APS\APSTAR\APSSTAR2.EXE" in the text box
16. Press Next
17. Select the APS folder and press Next
18. Type APSTAR2 for the shortcut name
19. Press Finish
20. Press OK at the customize Start Menu screen
21. Press OK at the Start Menu tab

2.9.5 Possible Workstation Problems

This section provides troubleshooting procedures in the event one of the following workstation problems occurs: The System Administrator or users will perform these troubleshooting procedures.

2.9.5.1 Damaged Disk

- 1) Find a replacement disk and select an address that does not conflict with the system.
- 2) Shutdown the computer and attach the replacement disk.
- 3) Attach the drive and check that both the replacement disk and tape drive have been detected.
- 4) Locate and restore files from the last full backup including the subsequent incremental backups.
- 5) Reboot the cluster and ensure the login is successful.
- 6) Record the event in the observer's logbook.

2.9.5.2 Faulty Monitor(s)

A faulty monitor may be due to several concerns. If as simple as a blown fuse, determine the type of fuse needed and replace it with a new one. If the faulty monitor is due to a greater concern, obtain the monitor's serial number and contact Service Assistance. Borrow a temporary monitor from another cluster member.

2.9.5.3 Faulty Workstation

In the event of a faulty workstation, replace with a spare or new workstation.

2.9.5.4 Unable to Power Up

If unable to power up, first check if the power supply cable has been properly attached. If there is still no power, contact the Service Company, providing the serial number and other necessary details. It may be necessary to obtain a temporary cluster member/power supply.

3 SOFTWARE OPERATIONS

The following sections describe the operation procedures of the APS application. Refer to the APS User's Manual for more detailed information.

3.1 INSTALLATION AND SETUP

This section provides assistance for administrators and deployment engineers to start the APS Software installation.

3.1.1 Installation

The following information is important when installing new software in the different servers and workstations:

- Anteon is responsible for the installation of new APS software releases in the different workstations.
- Anteon is responsible for upgrading the Oracle database in the different APS Servers.

The APS servers and workstations have the following hardware configurations:

- APS Server
- APS Standalone Server
- APS SCSI Interface Workstation
- APS Pertec Interface Workstation
- APS Standalone Workstation

Refer to section 2.1.5 (APS Servers) and section 2.1.6 (APS Workstations) for more information.

3.1.2 Configuration Parameter Setup

APS uses the apsw.ini file and the tape.ini file to configure its application. The configuration options for the apsw.ini file can be set from the Preferences dialog box in the APS application. From the APS menu, select File and then Options. The preferences dialog box will appear; it contains the following four tabs:

1. **Job**—Contains options pertaining to tape copying
2. **Character Set**—Contains options pertaining to ASCII/EBCDIC conversions

3. **Environment**—Contains options pertaining to the general operation of APS
4. **Printing**—Contains options pertaining to report and barcode printing

The apsw.ini file also has a link to the tapes.ini configuration file.

The tapes.ini file has configuration information for the different external tape drives. The information must be entered manually to configure the different external tape drives. Table 8 lists the device type, drive type, and signature necessary to configure each device.

TYPE OF INTERFACE	DEVICE TYPE	DRIVE TYPE	SIGNATURE
Cipher M990 PERTEC 9 track	iomtot	CIPHER_M990	
M4 PERTEC 9 track	iomtot	M4_9914	
Other PERTEC 9 track drives	iomtot	GNRC_PRTC	
StorageTek 4220 3480	iomtos	STK4220	STK 4280
Overland T490 3480	iomtos	T490	OVERLANDT490
Overland T490E 3490e	iomtos	T490E	OVERLANDT490E
Fujitsu M2488 3490e	iomtos	EXB8200	FUJITSU M2488E
Exabyte 8200 8mm	iomtos	EXB8200	EXABYTE EXB-8200
Exabyte 8505 8mm	iomtot	EXB8505	EXABYTE EXB-8505
Exabyte 4200c 4mm	iomtos	EXB4200c	EXABYTE EXB-4200c
Exabyte 4200 4mm	iomtos	EXB4200	EXABYTE EXB-4200
Archive Python 4mm	iomtos	EXB4200	ARCHIVE Python 28
SONY 4mm	iomtos	EXB4200	SONY SDT-5000
Archive Viper QIC150	iomtos	QIC150	ARCHIVE VIPER 150
Disk-File: all files in dir	iomtfl	FL_AUTO	
Disk-File: files in list file	iomtfl	FL_FILE	
Tape Image	iomtdf	TAPIMG	

Table 8: Device Configuration

The configuration information is different depending on device type.

➤ A signature is not necessary when configuring a

- Pertec device iomtot
- Disk File device iomtfl
- Tape Image device. Iomtdf

➤ An address is not necessary when configuring a

- Tape Image device. iomtdf

The following edits must be included in the tapes.ini file for the APS Workstations.

3.1.2.1 Pertec Interface

The following is a list of the necessary entries to configure the Pertec interface:

- The type is always iomt0t
- The address is always a single numeric value of “0” or “1”
- The drive type is type of hardware interface
- The description is a short description of the drive

The following is an example of a typical Pertec interface configuration.

```
[unit0]
type=iomt0t
address=0
drivetype=GNRC_PRTC
description=First 9 Track Drive
```

3.1.2.2 SCSI Interface

The following is a list of the necessary entries to configure the SCSI interface:

- The type is always iomt0s
- The address is always a comma separated numeric value in the format of “x,y,z” where “x” is the Host Adapter Id, “y” is the SCSI id, and “z” is always 0
- The drive type is type of hardware interface
- The signature is name of the hardware interface
- The description is a short description of the drive

The following is an example of a typical SCSI interface configuration.

```
[unit1]
type=iomt0s
address=0,1,0
drivetype=T490
signature=OVERLANDT490
description=First Overland T490 3480
```

3.1.2.3 Disk File

The following is a list of the necessary entries to configure the Disk File interface:

- The type is always iomtfl
- The address is the directory path and file name of the disk file
- The drive type is type of hardware interface
- The description is a short description of the File Drive

The following is an example of a typical SCSI interface configuration.

```
[unit2]
type=iomtfl
address=c:\Program Files\MMC\APS\dirlist.000
drivetype=FL_FILE
description=First Disk File Drive
```

3.1.2.4 Tape Image

The following is a list of the necessary entries to configure the Tape Image interface:

- The type is always iomtos
- The drive type is type of hardware interface
- The description is a short description of the tape image

The following is an example of a typical SCSI interface configuration.

```
[unit3]
type=iomtdf
drivetype=TAPIMG
description=First 'Tape-Image' File
```

3.2 APPLICATION ACCESS AND SECURITY

The APS Application runs in a secure network that is not connected to NARANET. The following sections include a description of the physical and automated access controls associated with the hardware, software, and communications components of the system. Section 3.2.1 lists the four Production Environments for the APS system, and Section 3.2.2 discusses the five Users Access Levels (Oracle roles) for the APS system.

3.2.1 APS Production Environments

APS systems are located in four different physical areas, depending on the level of restriction of its source.

- **Title 13**—Confidential Census data
- **Secret**—Secret National Security data
- **Top Secret / Top Secret-SCI**—Top Secret and Sensitive Compartmented Information National Security data
- **Unclassified**—Unclassified data

3.2.2 APS User Access Levels

The APS system supports users with differing levels of access to the APS database. The Security roles, User, Operator, Reviewer, Senior Reviewer, and Administrator have increasing levels of access privileges. Figure 2 graphically depicts the five security roles. Except for the User role, each access level has the privileges of the lower level. For example, the Reviewer role has all the privileges of the Operator role, in addition to other privileges.

New APS users usually begin their operations on APS in a User, Operator or Reviewer role. More experienced may operate in Senior Reviewer or Administrator roles. The privileges associated with each role are presented below:

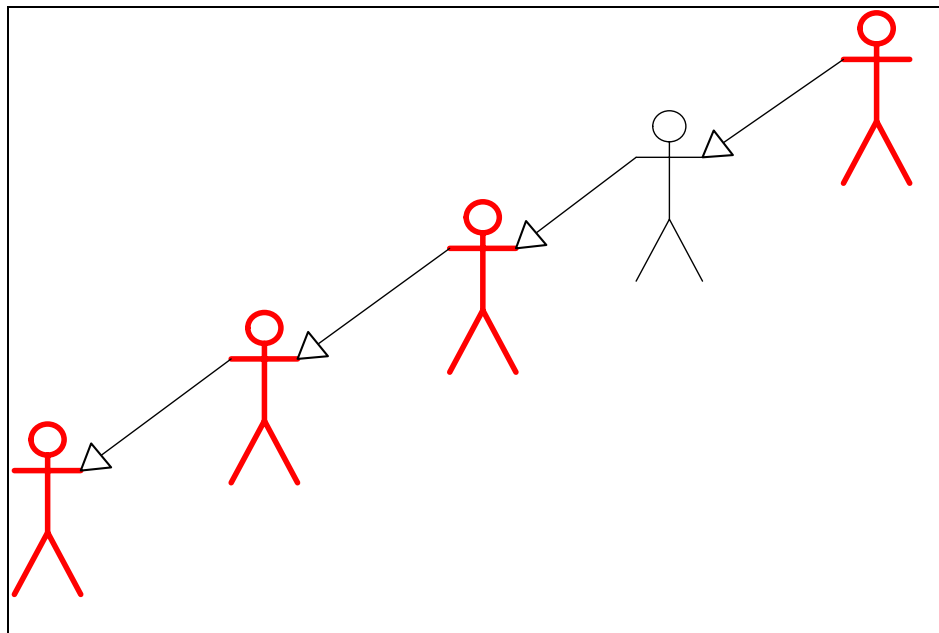


Figure 2: APS Role Hierarchy

3.2.2.1 USER

Users are typically archivists authorized to use APS for tape duplication and examination. Users have the following privileges:

- Log on to the APS system
- Perform duplication, directory, and dump operations
- Perform operations that do not require database interaction

3.2.2.2 OPERATOR

Operators copy jobs on the APS system. Operators have the following privileges:

- Privileges of the User
- View, edit, and add to all tables except the users table

3.2.2.3 REVIEWER

Reviewers have the following privileges:

- Privileges of the Operator
- Tag records for deletion

3.2.2.4 SENIOR REVIEWER

Senior Reviewers have the following privileges:

- Privileges of the Reviewer
- Approve and disapprove jobs
- Delete records that have been tagged for deletion

3.2.2.5 ADMINISTRATOR

Administrators have the following privileges:

- Privileges of the Senior Reviewer
- View, add, delete, or modify any of the tables in the database
- Add, modify, or delete all user's accounts on the APS system
- Access the historical database

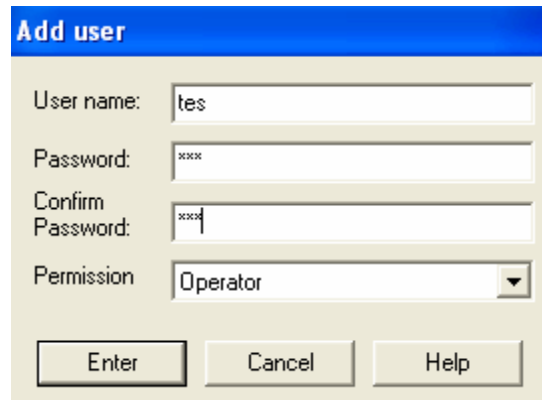
3.2.3 Managing APS Usernames and Passwords

The Administrator manages the APS users. The adding and deleting of users are discussed in the following sections.

3.2.3.1 Adding Users

To add new users, perform the following steps:

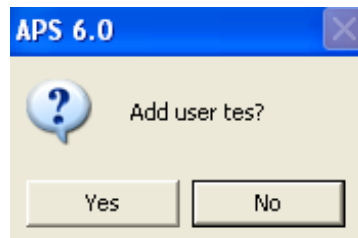
1. Select Add User from the Catalog menu
2. On the Add User Dialog box, enter the User ID, Password (twice to confirm), and Permission information. Figure 3 shows the Add User Dialog box.



The 'Add user' dialog box has a blue title bar. It contains four input fields: 'User name:' with the text 'tes', 'Password:' with 'xxx', 'Confirm Password:' with 'xxx', and 'Permission:' with a dropdown menu showing 'Operator'. At the bottom are three buttons: 'Enter', 'Cancel', and 'Help'.

Figure 3: Add User Dialog Box

3. An Add User Confirmation box will appear, asking to confirm you want to add this new user. Click on the Yes button and the system will add the user. Figure 4 shows the Add User Confirmation box.



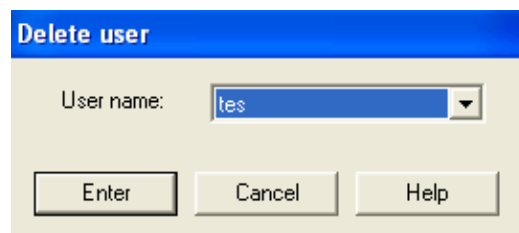
The 'Add user tes?' confirmation box has a blue title bar with 'APS 6.0' and a close button. It features a question mark icon and the text 'Add user tes?'. At the bottom are two buttons: 'Yes' and 'No'.

Figure 4: Add User Confirmation Box

3.2.3.2 Deleting Users

To remove a user from the system, perform the following steps:

1. From the Catalog menu, select Delete User.
2. In the Delete User box, select the user name to be deleted. Figure 5 shows the Delete User Dialog box.



The 'Delete user' dialog box has a blue title bar. It contains one input field: 'User name:' with a dropdown menu showing 'tes'. At the bottom are three buttons: 'Enter', 'Cancel', and 'Help'.

Figure 5: Delete User Dialog Box

3. The Delete User Confirmation box, confirms you want to delete this user. Click the Yes button and the system will remove the user. Figure 6 shows the Delete User Confirmation box.

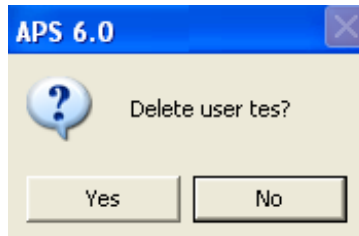


Figure 6: Delete User Confirmation Box

3.3 APPLICATION USE

The following sections provide an overview of the APS application. Detailed information on the APS application is found in the APS User's Manual.

3.3.1 Getting Started

The following sections discuss the basic APS application functions: Logging On, Changing the APS User Password, Logging Off, and Exiting.

3.3.1.1 Logging On

The user must log on to APS to enable the database-related functions (e.g. Master Copy). The Oracle server must be running to log on.

1. From the APS File menu, select Logon.
2. The APS Logon screen will appear. Enter the Service Name, User Name, and Password and then click OK button. Figure 7 shows the APS Logon screen.

The APS system will operate in an online mode and enable all functions that are associated with the user's role.



Figure 7: APS Logon Screen

Note: If the Select Data Source screen appears prior to the APS Logon screen, the “Prompt for ODBC when logging on” option is enabled. Figure 8 shows the Select Data Source screen. See Section 3.3.3.3 for instructions on how to Control the prompt for ODBC When Logging On option.

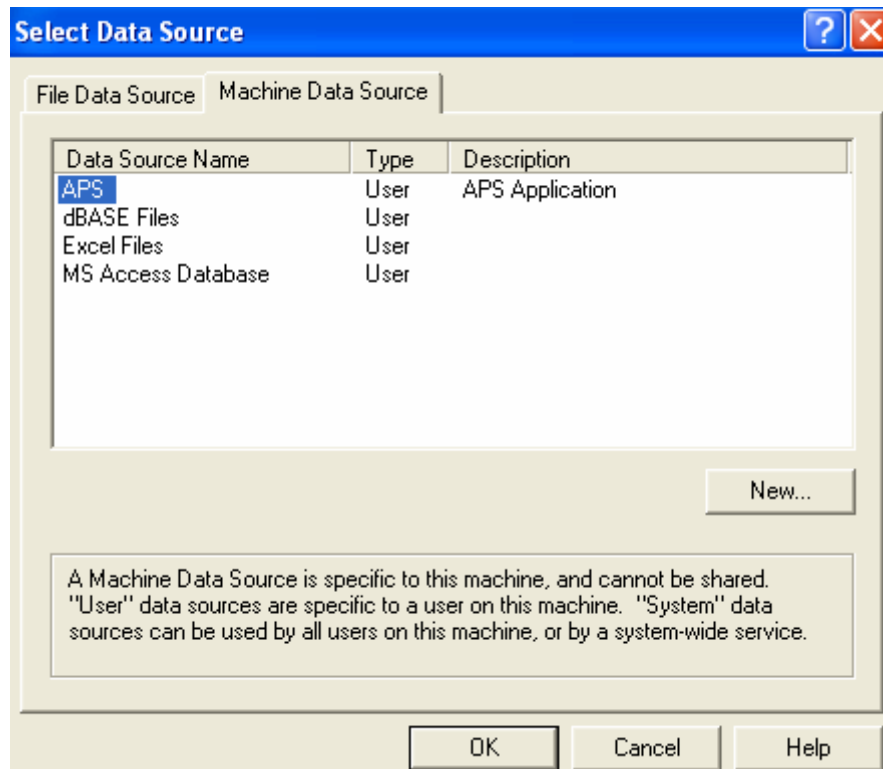


Figure 8: Data Source Selection Screen

3.3.1.2 Changing APS User Password

To change a user's password, perform the following steps:

1. From the Catalog menu, select Change Password.
2. The APS Change Password screen will appear. Enter the User name and new Password (twice for confirmation) and then click the Enter button. Figure 9 shows the APS Change Password screen.

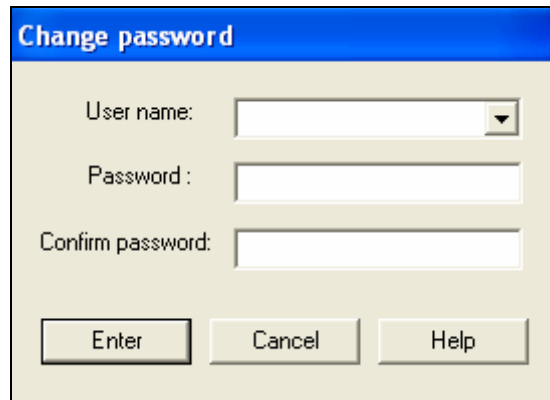


Figure 9: APS Change Password Screen

3.3.1.3 Logging Off

To Log off from the APS system, select Log off from the File menu. You will not be prompted to confirm this selection.

3.3.1.4 Exiting APS

To Exit the APS system, select Exit from the File menu. The APS Exit Confirmation screen will appear with the message: “Are you sure you want to exit?” Click the Yes button and the APS window will close. Figure 10 shows the APS Exit Confirmation screen.

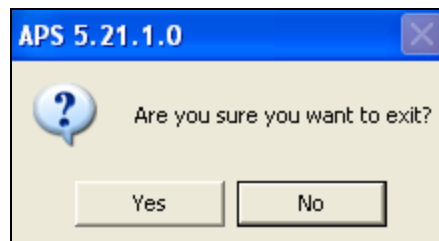


Figure 10: APS Exit Confirmation Screen

3.3.2 APS Main Window

This section presents the APS screen with the APS Menu Items. The APS Main Window is the first screen that appears after logging on to the APS System. Some of these commands are available from the APS Menu Bar.

3.3.2.1 APS Menu

The APS Menu is located in the upper left of the APS Main window. Figure 11 shows the available menu item on the APS Menu.

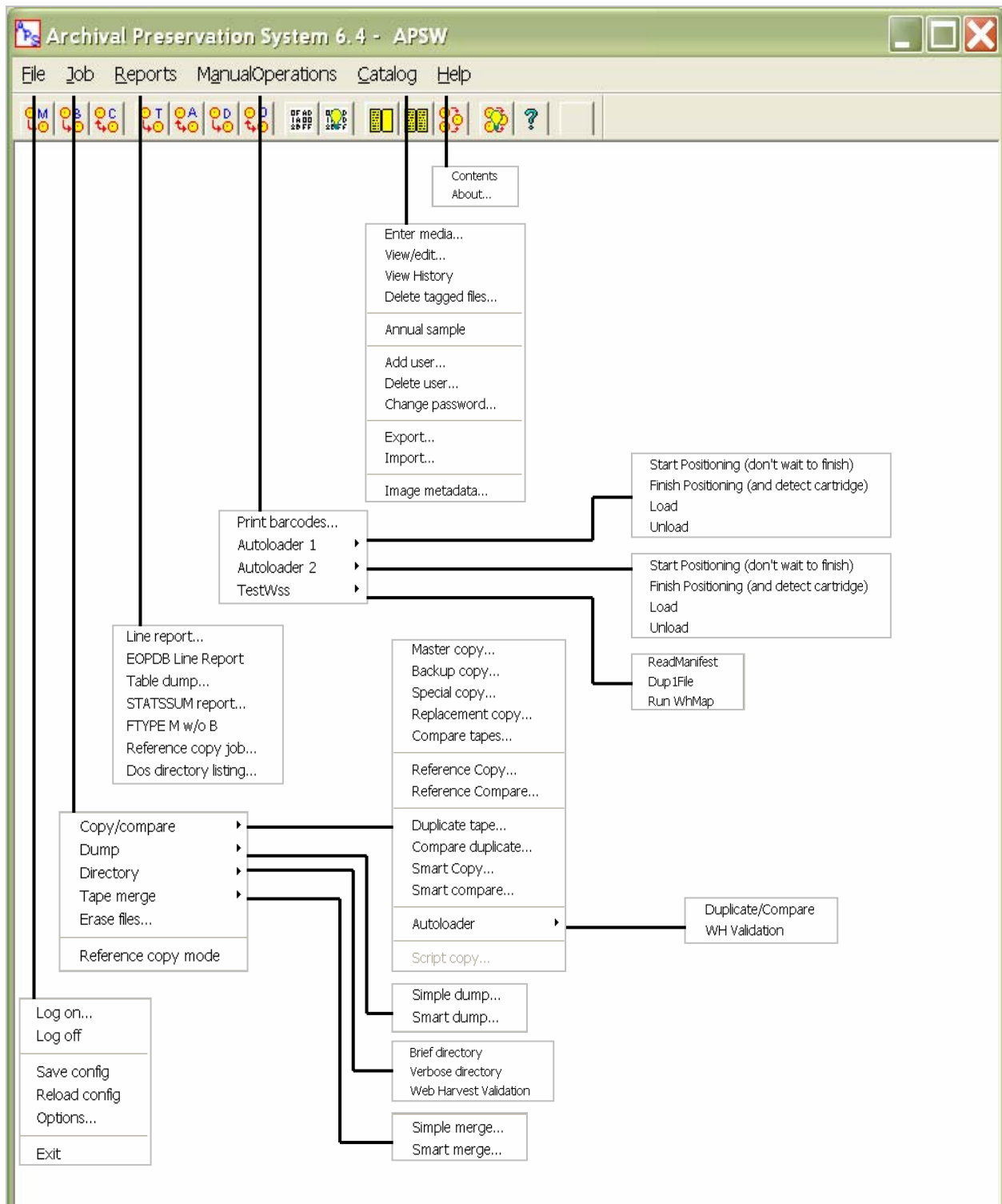


Figure 11: APS Menu

3.3.2.2 APS Menu Bar

The APS Menu Bar contains items available from the Job Menu, these items are placed as a Menu Bar items for easy access to repeatable functions. Figure 12 shows the APS Menu Bar.

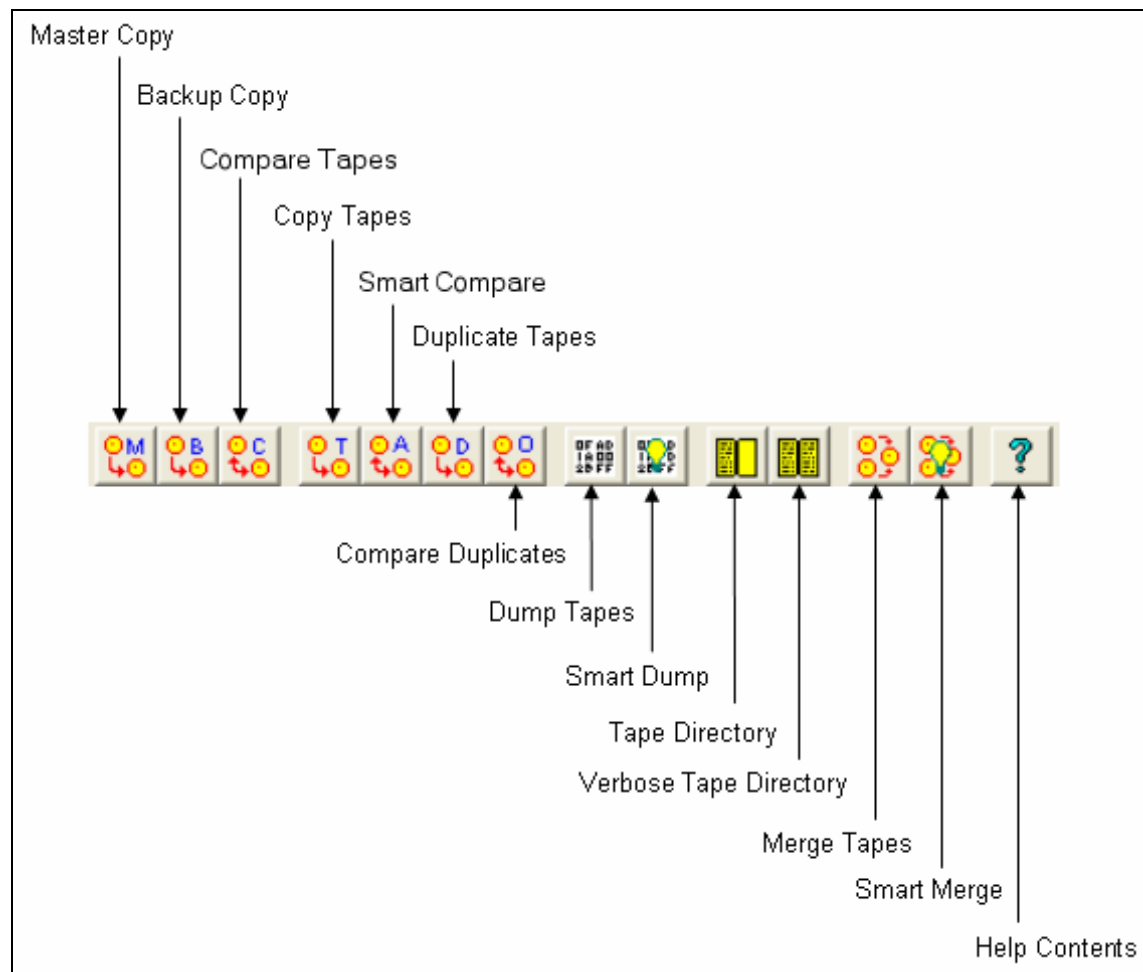


Figure 12: APS Menu Bar

3.3.3 Application Options

The Preferences dialog box allows the Administrator to set all of the APS Configuration options, as described in section 3.3.2.1. The Preferences dialog box contains the following four tabs:

- **Job**—Options pertaining to tape copying.
- **Character Set**—Options pertaining to ASCII/EBCDIC conversions.
- **Environment**—Options pertaining to the general operation of APS.
- **Printing**—Options pertaining to report and barcode printing.

3.3.3.1 Job Preferences

To configure Job settings, from the APS menu select File and select Options. The Preferences dialog box appears and then click the Job tab. Figure 13 shows the Job tab of the Preferences dialog box. The following fields are in the Job tab:

-
- **Reblocking Mode**—Specifies the output file block size. Can set all output blocks to approximately 12000 bytes, all output blocks have the same size as input blocks, or force the user to specify the block size during the copy job.
 - **User-Label Mode**—Specifies whether to include user labels on the output tape. Can be set to discard the user labels, to copy (translating from ANSI to OS or vice-versa as appropriate), or to discard but to create a file note. If a file note is created it is given a file note class (fnclass) of UL.
 - **Input Label Mode**—Specifies whether the system is to interpret labels found on the input tape. Can be set to interpret or bypass labels. If labels are bypassed, the user will be required to enter the block size, record size, and other characteristics of the input tape. A file note will be created for each file copied indicating that the label was bypassed. (Even if labels are bypassed, they are read and their contents are used to obtain default values for the tape characteristics).
 - **Output Label Type**—Specifies whether to include user labels on the output tape. Can be set to discard or copy (translating from ANSI to OS or vice-versa as appropriate) the user labels, or to discard the user labels to create a file note. If a file note is created, it is given a file note class (fnclass) of UL.
 - **File Naming Mode**—Set to assign output files the same name as input files, to require the user to enter the file names, or to automatically generate file names in the format FL##### where #####, as the sequence number of the file.
 - **File Copying Mode**—Specifies whether the system is to copy (or compare) all files on a volume or to pause before reading each file to allow the user to specify the number of the file (on the volume) to read.
 - **Input and Output Record Delimiters**—Specifies the string used to signify the end of a record when copying files with text type records. Any ASCII character including, ‘\f’ for form feed, ‘\r’ for carriage return, and ‘\n’ for newline, can be entered. Other characters can be entered as \## in which it is any decimal number. For example, EBCDIC newline will be entered as \05.
 - **Tape Error Mode**—Specifies how to handle tape errors. Can be set to record errors without stopping, only to stop if an unrecoverable (hard) error occurs, or to stop when any error occurs. If an error is encountered when the tape error mode is set to record errors without stopping, a message will be displayed for five seconds after which the copy job continues (entries may be added to the error table depending on the current operation and settings). If a recoverable (soft) error is encountered when the tape error mode is set to stop only on unrecoverable errors, a brief message will be displayed. If an unrecoverable read error is encountered, the system will stop and display an Error Dialog box. Pressing the + button next to the Tape Error mode will pop up the bad block in Copy Dialog box, allowing the user to set how bad blocks are handled during duplication.

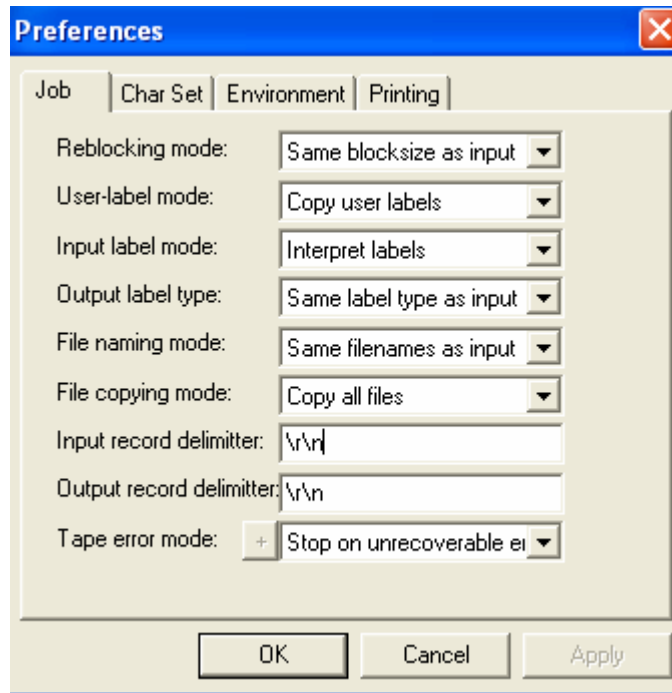


Figure 13: Preferences Dialog Box / Job Tab

3.3.3.2 Char Set Preferences

To configure the character settings or Char Set, from the APS menu select File and then Options. The Preferences dialog box will be displayed and then click on the Char Set tab. The Char Set preference will specify the character(s) to use when there is no valid conversion from ASCII to EBCDIC or from EBCDIC to ASCII. This character must be entered using its hexadecimal value. For example, the ASCII space will be entered as 20, EBCDIC space as 40. Figure 14 shows the Char Set tab of the Preferences dialog box.

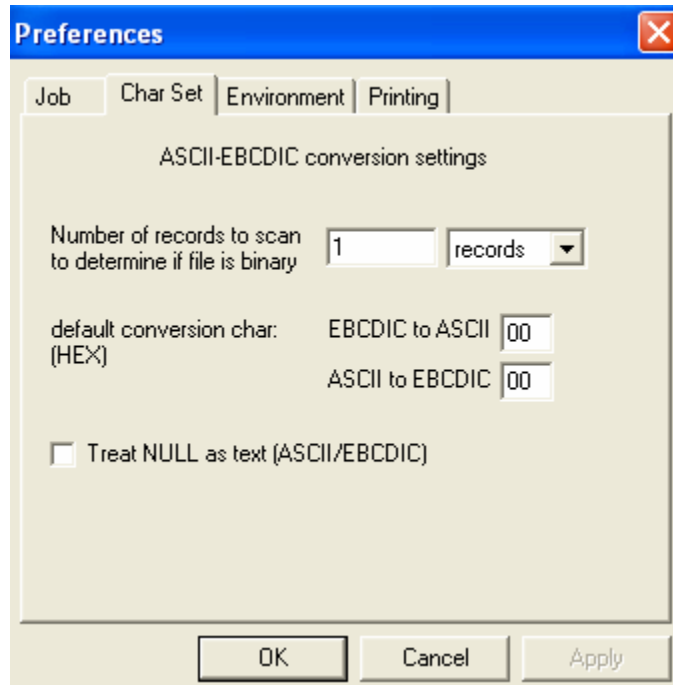


Figure 14: Preferences Dialog Box / Char Set Tab

3.3.3.3 Environment Preferences

The user will be prompted to enter the following information on the Environment tab:

- Error message display time
- Job report font size
- Space at bottom of dump report
- Auto blocking threshold
- Prompt for ODBC source when logging on
- CD-R temporary directory

To configure the Environment settings, from the APS menu, select File and then Options. The Preferences dialog box will be displayed and then click on the Environment tab. Figure 15 shows the Environment tab of the Preferences dialog box.

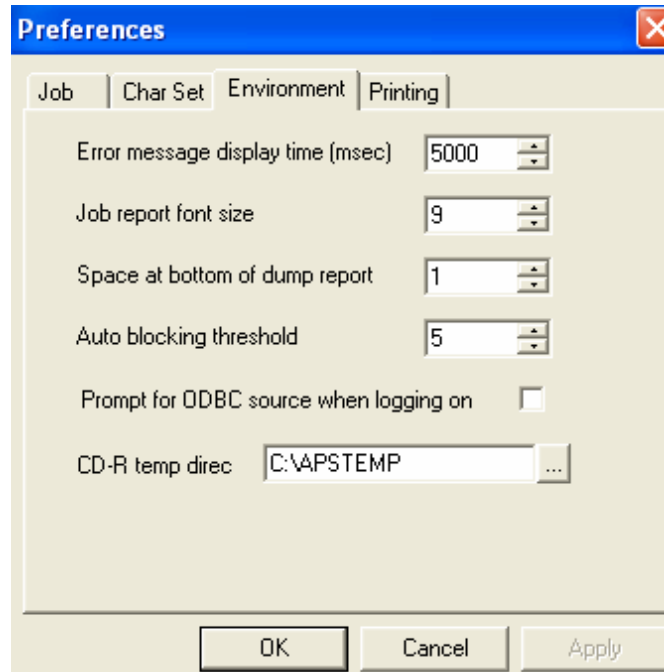


Figure 15: Preferences Dialog Box / Environment Tab

3.3.3.4 Printing Preferences

The APS system allows use of the Report printer and the Label printer. All generated reports are sent to the Report printer. Bar Code labels are sent to the Label printer. This allows the two printers to be connected simultaneously to the APS network. The APS machines are able to print using local printers and APS Network printers. Figure 16 shows the Printing tab of the Preferences dialog box.

To configure printer settings, from the APS menu select File and then Options. The Preferences dialog box will appear and then click on the Printing tab. APS will display the standard Windows print setup dialog box to configure the desired printer.

Print files are sent to the directory specified where they can be managed by the APS printer server. See the printer server documentation for more information on that product. This directory can be local or can be a shared network directory on a remote computer. Each file has a file name in the form of SFFCQQQQ.UUU. Where S = APS system number, FF = job fiscal year, C=Category (P=preservation, D=database), QQQQ = sequence number, UUU = userid. The files are in plain ASCII format with all header and footer lines preceded by the '!' character.

Reports can be sent to a physical printer, a print file, or both. Check the appropriate box to enable printing to that device. Reports generated by a copy or compare job can be formatted according to the current report printing mode. The setting is adjusted from the Report type drop-down list. The Setup Report Printer button allows you to chose the set which physical printer reports.

APS uses barcode labels to indicate the physical location of the tape. The Setup Label Printer button allows you to choose the label printer for printing barcode labels.

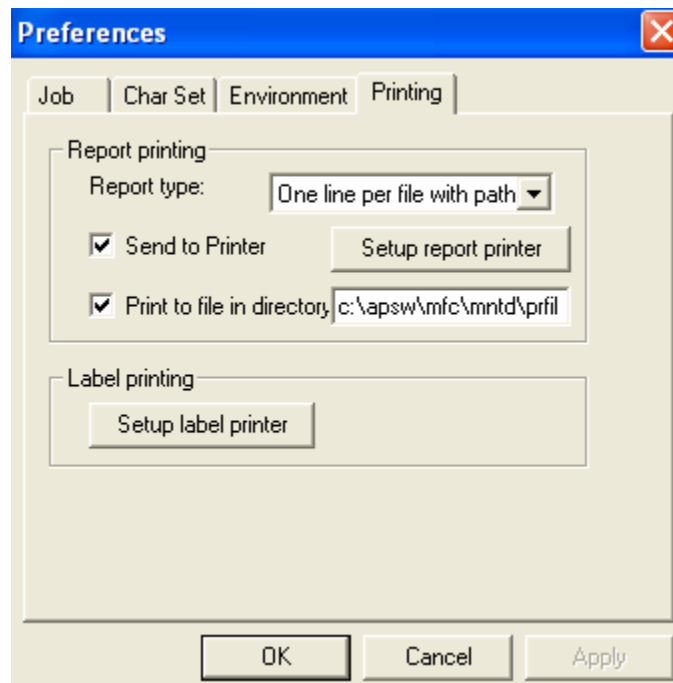



Figure 16: Preferences Dialog Box / Printing Tab

3.3.4 Save and Reload Configuration

To save the current APS configuration to the configuration file, from the APS File menu, choose Save config. The current settings are the default settings when APS is started. To reload the settings contained in the configuration file, from the APS File menu choose Reload Config.

3.3.5 APS Help

The APS Help Menu can be accessed from the Main Menu. Select Help and then select Contents. The Contents, Index, and Search tabs provide users with several options to retrieve information on APS or the use of a specific APS function. Also to access the Help Menu, from the APS Menu bar, press the Help Contents button . Figure 17 shows the APS Help Menu.

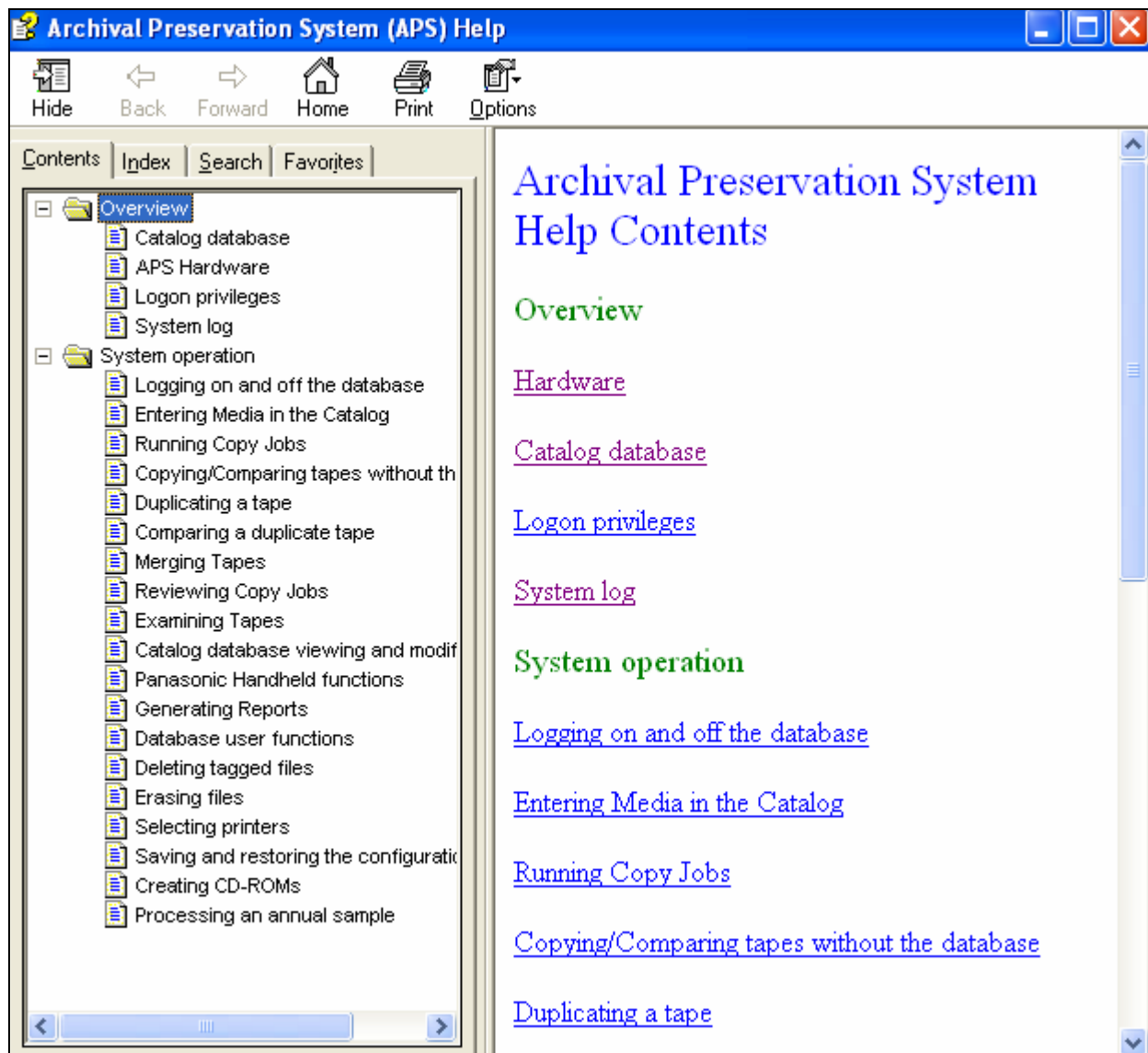


Figure 17: APS Help Menu

Topics from the Index tab can be added to the Favorites tab of the Help Menu. Click on the Favorite Tab, type the topic in the Current Topic field, and then click the Add button. Figure 18 shows the Favorites tab of the APS Help Menu.

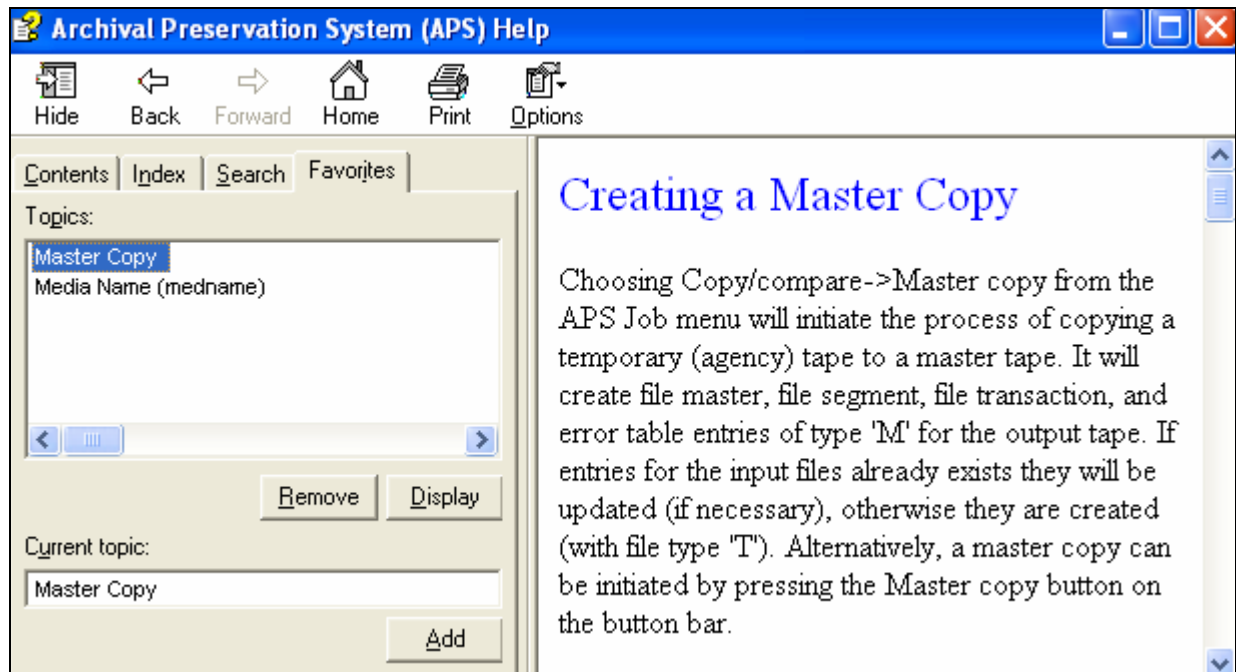
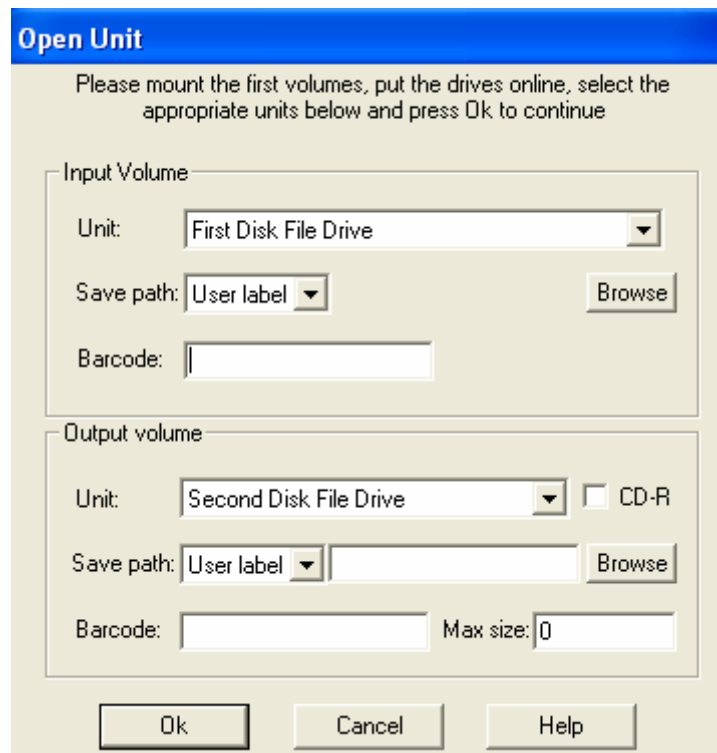


Figure 18: APS Help Menu/ Favorites Tab

APS Help Menu can be used in a context sensitive manner. The Help button will make available the topics related to the displayed screen. For example, if the Open Unit dialog box is displayed, clicking the Help button on that dialog box will display help topics related to the Open Unit dialog box. Figure 19 shows the Open Unit dialog box and Figure 20 shows Topic window of the Open Unit Dialog Help box.



Open Unit

Please mount the first volumes, put the drives online, select the appropriate units below and press Ok to continue

Input Volume

Unit:

Save path:

Barcode:

Output volume

Unit: ☐ CD-R

Save path:

Barcode: Max size:

Figure 19: Open Unit Dialog Box

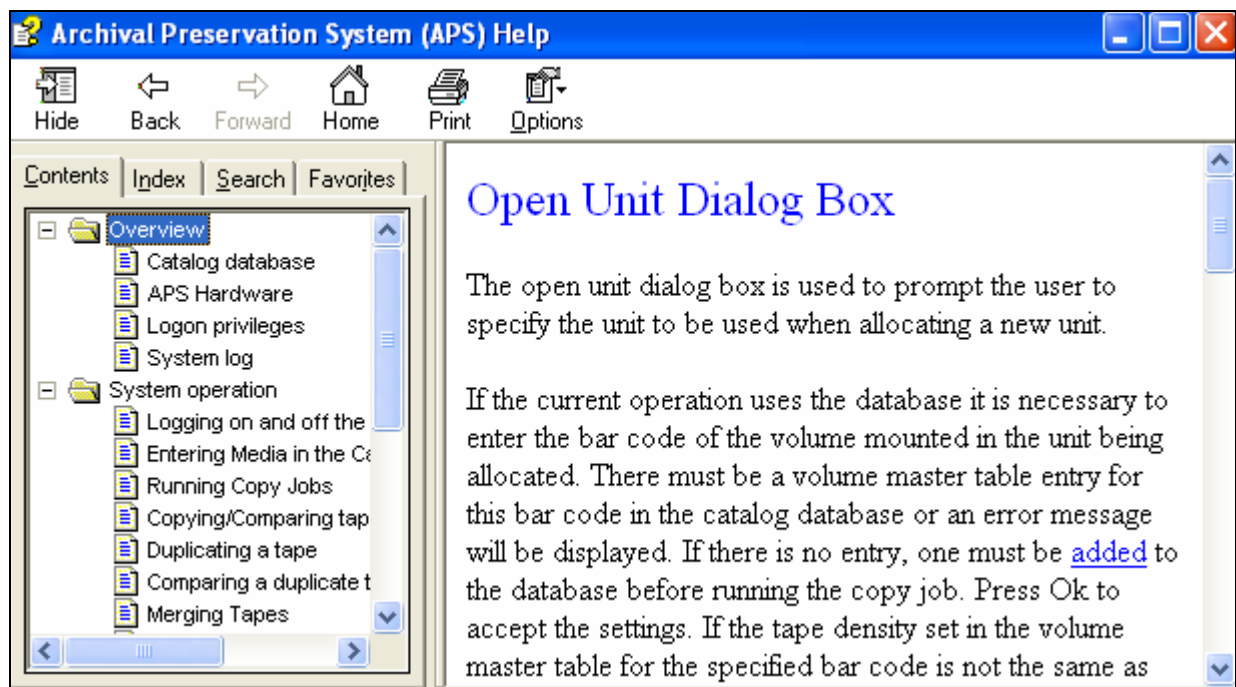


Figure 20: Open Unit Dialog Box Help Topic

3.3.6 APS Import/Export Utilities

This section describes the Import and Export functions of the Catalog Menu. APS Import and Export Utilities allow APS to export all data created on a local Catalog Database (CDB) and import it into another database. Every Volume Master (VM) Table row contains an Origcat column that identifies the CDB on which the VM row was created. All File Master, File Segment, Error, File Note, File Transaction, Volume Note, and Volume Transaction rows can be related back to the corresponding VM row. Access Export or Import functions from the Catalog Menu Item.

APS can back up all the rows created on the local system to a disk file by selecting the Catalog Export function. The user can choose the name and location of the disk file.

APS can read an Export file previously created by APS Export by selecting the Catalog Import function. All existing entries from the CDB to be imported are deleted before the import is performed. Also before the import, rows are checked to ensure there are no conflicts with the local CDB. For example, a FM, FS, FT, FN, or ER row can conflict if the ftype+fxno combination already exists in the database. A VM, VT, or VN row can conflict if the VBAR already exists in the database. If there are conflicts, a report will be generated and rows will not be imported.

The origcat column is automatically filled in when a user adds a new VM row to the database. APS will not permit the modifying or deleting of rows that were not created on the local database. This includes modifying rows via the catalog view/edit utility, copy jobs, or tape directories.

3.3.7 How to Use the APS Application

Reference the APS User's Manual document which is presented in the following major sections:

- | | |
|------------------|--|
| Chapter 1 | General Information —Provides an overview of APS and functionality. |
| Chapter 2 | APS Operations —Discusses the APS operation including; APS produced file copies and reports, security roles and associated privilege, and workstation hardware. |
| Chapter 3 | Screen Layout —Identifies the options and functions of the APS Main Menu and Menu Bar. |
| Chapter 4 | Getting Started —Details the four basic APS functions. |
| Chapter 5 | Help Menu —Describes how to gain access to the Help Menu. |
| Chapter 6 | Entering Media —Shows the process used to enter information about storage media used for copy jobs. |

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- Chapter 7 Generating Copies**—Details the APS process used to generate Master, Backup, Special, Replacement and Smart Copies.
- Chapter 8 Comparing Tapes**—Describes the process to compare tapes using Compare Tapes and Smart Compare.
- Chapter 9 Generating Duplicate Tapes**—Explains the process for generating Duplicate Tapes.
- Chapter 10 Comparing Duplicate Tapes**—Shows the process used to Compare Duplicate tapes.
- Chapter 11 Generating Directories**—Describes the process used to generate directories.
- Chapter 12 Dump Functions**—Discusses the use of Dump functions.
- Chapter 13 Tape Merge Functions:** Shows the use of Tape Merge.
- Chapter 14 Erase Files From Media**—Describes the process used to erase files from media.
- Chapter 15 Putting APS in Reference Copy Mode**—Discusses the method and reason for putting APS in Reference Copy Mode.
- Chapter 16 Managing the Database**—Details the functions to manage the database.
- Chapter 17 Viewing and Storing Image Metadata**—Shows the process used to view and store information on images.
- Chapter 18 Managing Users**—Describes the functions for Administrators to manage users.
- Chapter 19 Generating Reports**—Lists the available reports and describes the process used to generate the reports.
- Chapter 20 APS Configuration**—Shows how to use the Options function to configure APS and discusses the use of the Save and Reload Configuration functions.
- Chapter 21 Print Barcodes**—Shows how to print barcodes for media labels.
- Chapter 22 Catalog Database (CDB) Description**—Discusses the APS Database tables.

3.4 CATALOG DATABASE (CDB) DESCRIPTION

The Catalog Database (CDB) is divided into primary data structures and secondary data structures. Primary data structures store information about files and the media where they are stored. Secondary data structures store information about APS menus, options, and users. Only APS Administrators are allowed to modify Secondary data structures. The CDB can be examined or altered using the View/Edit screen. The APS User's Manual discusses the View/Edit screen and other functions for managing the CDB. The following sections describe the Primary and Secondary database structures.

3.4.1 Primary Data Structures

Table 9 is a list of individual database fields for the Primary database structures.

Table Name	Expanded Table Name	Description
FM	File Master Table	File information.
FS	File Segment Table	File Segment information
FT	File Transaction Table	Records every transaction performed on the files.
FN	File Notes Table	Operator's notes for each file.
ER	Error Table	Records tape read/write errors.
MTD	Metadata Table	Information about files containing images.
VM	Volume Master Table	Information about storage volumes.
VT	Volume Transaction Table	Records every transaction performed on volumes.
VN	Volume Notes table	Operator's notes for each volume.

Table 9: Primary Data Structure Tables

Table 10 lists the Secondary data structures that store information about their files and the media.

Field Name	Table	Conceptual Name	Definition
access	FM	Access	File's availability (level of restriction).
accitem	FM	NARA Accession Number Item Number	NARA Accession Number Item Number.
accaff	FM	NARA Accession Number Office Prefix	NARA Accession Number Office Prefix.

Field Name	Table	Conceptual Name	Definition
accyear	FM	NARA Accession Number Year	NARA Accession Number Year.
acronym	FM	Acronym or Code	Acronym or code.
alrecctef	ER	Affected Logical Record Cnt Est Flg	Indicates whether the Affected Logical Record Count is estimated or actual.
bcp	VM	Barcode Printed	Yes—If barcode label has been printed, No—If barcode label has not been printed.
begdat	FM	Beginning Date	Beginning date.
blksiz	FM	Block Size	Number of bytes in a block. Blocks are a collection of contiguous records recorded as a unit and separated by interblock gaps with each block containing one or more records.
charset	FM	Character Set	Unique arrangement of binary codes used to determine the characters represented.
crdat	FM	Creation Date	Date (YYYYDDD) for when the file was written on the volume.
ctrlflg	FM	Control Character Flag	Presence of print operation control characters.
dws1	FM	Date written same as label? [y/n]	Was the file actually written on the date on the tape label?
edat	ER	Error Date	Date (YYYYDDD) for when the permanent read error occurred or the record(s) was deleted.
element	ER	Metadata element	Type of metadata describing a file.
enddat	FM	Ending date	Ending date
error	ER	Error Type	Indicates whether the segment contains read errors or records that have been deleted.
fblkct	FM	File Block Count	Number of physical blocks in the file.
fbytct	FM	File Byte Count	Number of bytes in the file. For files not processed on APS, this may be an estimate indicated via the File Size Estimated Flag.
fbytctef	FM	File Byte Count Estimated Flag	Indicates whether the file byte count is estimated or actual.
fid	FM	File Identifier	Identifier in the first file header label and the first file trailer label, which is read to verify that the correct file is being used. If the volume does not have standard labels, the file is assigned an external identifier.

Field Name	Table	Conceptual Name	Definition
flrecct	FM	File Logical Record Count	Number of logical records in the file.
fnauth	FN	File Note Author	User Name of the person authoring the file note.
fnclass	FN	File Note Class	Note classification.
fncol	FN	File Note Column Number	Column's item number referring to the note.
fn-dat	FN	File Note Date	Date (YYYYDDD) the file note was entered.
fnlno	FN	File Note Line Number	Sequence number of the line within the note beginning with 01.
fnote	FN	File Note	Description of technical or preservation issues specific to the file.
fop	FT	File Operation	Type of online activity performed at the file level.
fopcc	FT	File Operation Completion Code	File operation's result (success or a general cause of failure).
fopdat	FT	File Operation Date	Date (YYYYDDD) the file operation was performed.
foper	FT	File Operator	User Name of the person performing the file operation.
foprev	FT	File Operation Reviewer	User Name of the person reviewing the file operation.
foprevdat	FT	File Operation Review Date	Date (YYYYDDD) the file operation was reviewed.
frcverct	FM	File Recovered Error Count	Number of blocks with temporary read errors encountered in the file that were recovered by additional reads or cleanings.
free	VM	Freespace Percent	Percent of free space remaining on the volume.
fseqno	FM, FS	File Sequence Number	Relative position of the file on a volume set.
ftitle	FM	Full title	Full title of file.
ftype	FM, FS, FT, FN, MTD	File Type	Identifies the type of file.

Field Name	Table	Conceptual Name	Definition
fxno	FM, FS, FT, FN, ER, MTD	File XMIS Number	Obtained from the XMIS Data File Register maintained by NSXA. No number is reused regardless of the file's disposition.
jobfy	FM	Preservation Job Fiscal Year	For NARA written file copies, contains the fiscal year (ends 9/30). For non-NARA file written file copies, contains blanks.
jobno	FM	Preservation Job Number	For NARA written file copies, contains the sequence number within the fiscal year. For non-NARA file written file copies, contains an abbreviated form of the Preservation Status (#0800). Used to locate the job output for NARA-written copies.
label	VM	Label Type	Type of label recorded on the volume. Labels are records at the beginning of the media and preceding and/or following each file. The labels are separated from the files and each other by tapemarks and contain information that identifies and describes the data.
lrecl	FM	Logical Record Length	Number of bytes in a fixed length record or the maximum number of bytes in a variable- or undefined-length record.
mdata	MTD	Metadata	Value of metadata describing a file.
medcap	VM	Media Capacity	Bits per inch for magnetic tape or bytes per volume for other media.
medlot	VM	Media Lot	Code representing the unique lot, batch, or other control designation assigned by the manufacturer.
medname	VM	Media	Code representing the manufacturer and brand.
medstype	VM	Media Sub-Type	Subtype of media on which the segment is recorded (i.e. tracks for magnetic tape and physical dimension for other media).
medtype	VM	Media Type	Media on which the segment is recorded.
nfiles	FM	Number of files	Number of individual files contained in or represented by this File Master row (e.g. for TAR files).
origcat	VM	Originating catalog	Identifies on which catalog database (CDB) the volume master entry was created.

Field Name	Table	Conceptual Name	Definition
origsys	FM	Originating System	System on which the file copy was produced.
pstat	FM	Preservation Status	Indicates whether the file is an agency or NARA copy. Indicates whether it has been, must be, or must not be copied or whether the copy has been approved for use.
recfm	FM	Record Format	Indicates whether the record format lengths are fixed, variable, spanned, undefined, or delimited.
rgnum	FM	NARA Accession Number Record Group Number	NARA Accession Number Record Group Number.
sblkct	FS	Segment Block Count	Number of physical blocks in the segment.
sbytct	FS	Segment Byte Count	Number of bytes in the segment. For files not processed on APS, this may be an estimate indicated via the File Size Estimated Flag.
slrecct	FS	Segment Logical Record Count	Number of logical records in the segment.
smlrct	FS	Segment Missing Logical Record Cnt	If known, number of logical records deleted when the segment was written. If not known, an estimated number of logical records deleted when the segment was written.
smlrctef	FS	Seg Miss Logical Record Cnt Est Flg	Indicates whether the Segment Missing Logical Record Cnt is estimated or actual.
sno	FS, ER	Segment Number	Order of the volume within a multivolume file, which is always 001 for a single volume file.
sno	FS, ER	Segment Number	Order of the volume within a multivolume file, which is always 001 for a single volume file.
sortex	FM	Sort Extender	Optional extender for sorting and interrelating files.
sortino	FM	Sort Item Number	Item number used for sorting and interrelating files.
sortrg	FM	Sort Record Group	Record Group assigned for sorting and interrelating files.
sortyr	FM	Sort Year	Fiscal Year used for sorting and interrelating files.

Field Name	Table	Conceptual Name	Definition
soursys	ER	Source System	System on which a permanent read error occurred, subsequent to the file's creation on the originating system.
srcverct	FS	Segment Recovered Error Count	Number of blocks with temporary read errors encountered in the segment, which were recovered by additional reads or cleanings.
stblk	ER	Starting Block	Block number at which the permanent read error or the deleted block begins.
stitle	FM	Short Title	Unique short title assigned to a file or identical copies of a file
stlrec	ER	Starting Logical Record	Logical record number at which the permanent read error or deleted record begins.
surcverct	FS	Segment Unrecovered Error Count	Number of blocks in the segment with permanent read errors.
valoc	VM	Volume Assigned Location	Volumes permanently assigned physical location (i.e. the numbered slot within the media rack).
vbar	FS, VM, VT, VN	Volume Bar Code	Unique bar code assigned to a volume using the '3 of 9' (also known as Code 39) symbology.
vid	VM	Volume Identifier	For a volume with standard labels, the first record following the BOT reflector strip is the volume label (VOL1). This contains the Volume Identifier that is read by the system to verify that the correct volume is mounted. If the volume does not have standard labels, the volume is assigned an external identifier.
vnauth	VN	Volume Note Author	User Name of the person authoring the volume note.
vnclass	VN	Volume Note Class	Note classification.
vncol	VN	Volume Note Column Number	Column's item number referring to the note.
vndate	VN	Volume Note Date	Date (YYYYDDD) the volume note was entered.
vnlno	VN	Volume Note Line Number	Sequence number of the line within the note beginning with 01.
vnote	VN	Volume Note	Description of technical or preservation issues specific to the volume.

Field Name	Table	Conceptual Name	Definition
vop	VT	Volume Operation	Discrete off-line activity performed on a physical volume without referencing a specific file.
vopcc	VT	Volume Operation Completion Code	Indicates the volume operation's result (i.e. success or a general cause of failure).
vopdat	VT	Volume Operation Date	Date (YYYYDDD) the volume operation was performed.
voper	VT	Volume Operator	User Name of the person performing the file operation.
vploc	VT	Volume Processing Location	Volume's numbered slot within the media rack or a designated site while out of its assigned location during processing.

Table 10: Primary Data Structure Fields

3.4.2 Secondary Data Structures

The secondary data structures store information about APS menus, options, and users. They can be modified selecting the Catalog and then the View/Edit command, as described in the User's Manual. Only APS Administrators are allowed to modify secondary data structure tables. Table 11 lists the APS Database Secondary Data Structure tables.

Table Name	Expanded Table Name	Description
ref	Reference Timing Information	Timing information produced by reference copy jobs.
rvw	Reviewer List	Entry for each APS user with Reviewer privileges or higher.
Sys	System Information	System settings for all APS systems attached to the CDB.
tpval	Column Validation Rules Table	Field name and field validation rule.
tplist	Drop-Down List Values Table	Field name and available values, with a description of each value and display order specifications.
tperr	Error Message Table	Field name and error message to display if validation rules are violated.
tprow	Row Edit Validation Rules	Stores up to three pairs of field names and field validation rules, which all must be met for a row modification to be valid.
usr	User List	Entry for each APS user.

Table 11: Secondary Data Structure Tables

Appendix A: Oracle Reserved Words

Table 12 lists are words reserved by Oracle that cannot be redefined. The user is unable to use these to name APS objects, such as columns or data tables. If used, that action may cause the data to improperly load or cause system failure.

ACCESS	ELSE	MODIFY	START
ADD	EXCLUSIVE	NOAUDIT	SELECT
ALL	EXISTS	NOCOMPRESS	SESSION
ALTER	FILE	NOT	SET
AND	FLOAT	NOTFOUND	SHARE
ANY	FOR	NOWAIT	SIZE
ARRAYLEN	FROM	NULL	SMALLINT
AS	GRANT	NUMBER	SQLBUF
ASC	GROUP	OF	SUCCESSFUL
AUDIT	HAVING	OFFLINE	SYNONYM
BETWEEN	IDENTIFIED	ON	SYSDATE
BY	IMMEDIATE	ONLINE	TABLE
CHAR	IN	OPTION	THEN
CHECK	INCREMENT	OR	TO
CLUSTER	INDEX	ORDER	TRIGGER
COLUMN	INITIAL	PCTFREE	UID
COMMENT	INSERT	PRIOR	UNION
COMPRESS	INTEGER	PRIVILEGES	UNIQUE
CONNECT	INTERSECT	PUBLIC	UPDATE
CREATE	INTO	RAW	USER
CURRENT	IS	RENAME	VALIDATE
DATE	LEVEL	RESOURCE	VALUES
DECIMAL	LIKE	REVOKE	VARCHAR
DEFAULT	LOCK	ROW	VARCHAR2
DELETE	LONG	ROWID	VIEW
DESC	MAXEXTENTS	ROWLABEL	WHENEVER
DISTINCT	MINUS	ROWNUM	WHERE
DROP	MODE	ROWS	WITH

Table 12: Oracle Reserved Words

Appendix B: Data Types

The data types for individual elements in the layout must be verified, so that the proposed layout within APS is consistent with the Agency and NARA-produced documentation. It must be noted that Agencies often misdefine fields as NUMBER data. In addition, check that the data type is suitable for database loading, search and retrieval, and online presentation. NWME must verify that the data type is correct or create a Decision Memorandum that proposes a workable solution or alternative.

There are four choices for the Data type in the data layout:

- VARCHAR2
- NUMBER
- DATE
- ZONED

VARCHAR2

VARCHAR2 data are numeric character data that are not used for counting or mathematical calculations. Social Security numbers and zip codes contain numeric data but are considered VARCHAR2 data. If NUMBER data were chosen for a zip code or other numeric data field in which there are leading zeros, then leading zeros will be dropped because “numbers” do not have leading zeros. The VARCHAR2 data type will be displayed to users in AAD as “ALPHANUMERIC”.

Number

The NUMBER data type is numeric data used for counting or mathematical computations. The NUMBER data type uses numeric data for counting or mathematical calculations such as social security numbers and zip codes. The NUMBER data type cannot have leading zeros; if they are present, they will be dropped. The NUMBER data type will be displayed to users in AAD as “NUMERIC”.

The Decimal Places field indicates where the decimal point must be placed in the data. The Decimal Places field can remain blank if no decimal places implied in the data. For example, if a data field has the value 102 and the documentation indicates that the value represents 1.02, the user will define the data type to be NUMBER and the decimal places to be 2.

Date

The DATE data type is used for data fields that represent a date. The DATE data type will be displayed to users in AAD as DATE. If the data type is DATE then the following fields must be examined as well:

-
- LOWEST YEAR
 - FORMAT MASK

Lowest Year

The LOWEST YEAR field must be entered when only two digits are used to represent the year portion of the date and any of the years represented in the data are prior to 1950. If the date field meets these criteria, then the earliest possible year represented in the data must be entered in the LOWEST YEAR field as a four-digit date. The LOWEST YEAR can be determined by using the show “All Values” on the NARA Staff-Only server. The LOWEST YEAR may change when additional data files are loaded. This will need to be re-checked when all the data files are available.

Format Mask

The FORMAT MASK is required for all date fields. M is used to represent a position for the month portion of the date, D is used to represent a position for the day portion of the date, and Y or R is used to represent the year portion of the date. For AAD purposes, there is no distinction between Y and R. Without a valid FORMAT MASK, the field cannot be designated as a date. Notes or other information may not be entered in a FORMAT MASK. Examples of valid FORMAT MASKS include the following:

- MM/DD/YYYY
- MM/DD/YY
- YY/MM/DD
- YYYYMMDD
- DD-MMM-YY

Zoned

The ZONED data type is a special instance of a NUMBER data type. To use this data type, all data records must conform to the Zoned Decimal standard or be a non-standard Zoned Decimal with a known meaning. The ZONED data type will be displayed to users in AAD as “NUMERIC”.

What is a Zoned Decimal?

Zoned Decimal is a data format often used in business applications. A number is stored in a decimal (base 10) format rather than a binary format. Essentially, the decimal representation of the number is stored as character data. For example, in a system using the EBCDIC code, the number 385 stored in a 6-byte Zoned Decimal field will be stored as the character string "000385". The actual data as stored in hex will be F0F0F0F3F8F5 (the EBCDIC for the digit "0" is F0, and so on). Note that the same number stored as a four-byte binary will have the hex representation 00000181.

With signed binary numbers, the first bit is used to indicate the sign, and two's complement form is used for negative numbers. Zoned Decimal format uses an even stranger method to specify a signed quantity. The reason for the strangeness is due to the way the Hollerith code (the punched card code from which EBCDIC is descended) works. In the Hollerith code, if a number punched on the card is signed, the last digit has an extra hole punched on the card to indicate either a + or a - sign. When the Hollerith code was made into the EBCDIC code, it turned out that the area in which the sign hole was punched was made to be the first half of the byte, called the zone portion. The area of the card in which the number itself was punched was made into the second half of the byte, called the digit portion. For example, the digit "5" in EBCDIC is represented by the hex number F5. The F (the first half of the byte) is the zone portion of that byte, and the 5 is the digit portion. While no punch in the zone portion of the card is represented in EBCDIC with the hex number F, the punch representing a + sign is represented with a hex C and the punch for the - sign is represented with a hex D. Thus, if a zoned decimal number is positive, the first half of the last byte is a hex C, and if it is negative, the first half is a D. Table 13 shows an example of the character representation for Zoned Decimal numbers (EBCDIC).

Assuming a four-byte zoned decimal number		
Quantity	Hex	Character
385	F0F3F8F5	0385
+385	F0F3F8C5	038E
-385	F0F3F8D5	038N

Table 13: Zoned Decimal Numbers (EBCDIC)

Programmers who enter data directly into Zoned Decimal format (to create sample data test), will use a text editor (e.g., VAX EDIT program) to create the test data rather than a hexadecimal editor. The data will be entered as if it were character data, even though it is not quite because of the strange way of specifying the sign. Table 14 lists the characters that represent the possible last bytes of a Zoned Decimal number (EBCDIC).

Last Digit	--- Character (Hex Code) --- Assuming the EBCDIC code is used		
	Unsigned	Positive	Negative
0	"0" (F0)	"{" (C0)	"}" (D0)
1	"1" (F1)	"A" (C1)	"J" (D1)
2	"2" (F2)	"B" (C2)	"K" (D2)
3	"3" (F3)	"C" (C3)	"L" (D3)
4	"4" (F4)	"D" (C4)	"M" (D4)
5	"5" (F5)	"E" (C5)	"N" (D5)
6	"6" (F6)	"F" (C6)	"O" (D6)
7	"7" (F7)	"G" (C7)	"P" (D7)
8	"8" (F8)	"H" (C8)	"Q" (D8)

9	"9" (F9)	"I" (C9)	"R" (D9)
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Table 14: Last Digit of Zoned Decimal Numbers (EBCDIC)

Unfortunately, the Zoned Decimal format does not easily translate into the ASCII code, since ASCII uses different codes to represent the digits and letters. On most ASCII machines, the same characters are used, even though the hex codes for them are different. Table 15 and Table 16 show the differences from an EBCDIC machine.

Table 15 provides an example of the Zoned Decimal Numbers (ASCII).

Assuming a four-byte zoned decimal number		
Quantity	Hex	Character
385	30333835	0385
+385	30333845	038E
-385	3033384E	038N

Table 15: Zoned Decimal Numbers (ASCII)

Table 16 provides an example of the Last Digit of Zoned Decimal Numbers.

Last Digit	Character (Hex Code) Assuming the ASCII code is used		
	Unsigned	Positive	Negative
0	"0" (30)	"{" (7B)	"}" (7D)
1	"1" (31)	"A" (41)	"J" (4A)
2	"2" (32)	"B" (42)	"K" (4B)
3	"3" (33)	"C" (43)	"L" (4C)
4	"4" (34)	"D" (44)	"M" (4D)
5	"5" (35)	"E" (45)	"N" (4E)
6	"6" (36)	"F" (46)	"O" (4F)
7	"7" (37)	"G" (47)	"P" (50)
8	"8" (38)	"H" (48)	"Q" (51)
9	"9" (39)	"I" (49)	"R" (52)

Table 16: Last Digit of Zoned Decimal Numbers (ASCII)

Note that the hex code for the last digit has lost its significance on an ASCII computer; it is due to zoned decimal data can be passed from ASCII machines to EBCDIC machines in the same way that text data is passed: by converting every ASCII code to the corresponding EBCDIC code for the same character. (IBM's RS/6000, which is IBM's first large-scale ASCII machine, uses a different approach from other ASCII based machines. IBM uses the normal ASCII codes for the last digits of both unsigned and positive values ("0" [hex 30] to "9" [hex 39]) and uses the characters "p" [hex 70] through "y" [hex 79] for the last digit of negative values).

Realize that zoned decimal format is less compact than binary format. A four byte signed binary number can store values from -2147483648 to +2147483647, whereas a four byte zoned decimal number can only hold values from -9999 to +9999. Zoned decimal format tends to be used in languages such as COBOL, which have a long history dating back to the days when programmers had to enter the data in machine-readable form (e.g. using punched cards).